```
=> FILE REG
FILE 'REGISTRY' ENTERED AT 11:15:13 ON 26 OCT 2007
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=> DISPLAY HISTORY FULL L1-

     FILE 'REGISTRY' ENTERED AT 10:38:48 ON 26 OCT 2007
L1           890 SEA (LI (L) MN (L) O)/ELS (L) 3/ELC.SUB
                 E POLYETHYLENE/CN
L2             1 SEA POLYETHYLENE/CN
                 E POLYPROPYLENE/CN
L3             1 SEA POLYPROPYLENE/CN

     FILE 'HCA' ENTERED AT 10:40:03 ON 26 OCT 2007
L4        244601 SEA (BATTERY OR BATTERIES OR (ELECTROCHEM? OR ELECTROLY?
                 OR GALVANI? OR WET OR DRY OR PRIMARY OR SECONDARY)(2A)(CE
                 LL OR CELLS) OR WETCELL? OR DRYCELL?)/BI,AB
L5           5840 SEA L1
L6         193683 SEA L2
L7         115502 SEA L3
L8          10278 SEA SHUTDOWN? OR SHUT?(2A)DOWN?
L9           1260 SEA CONTRACT?(2A)(AREA# OR RATIO? OR PROPORTION? OR
                 FRACTION?)
L10           221 SEA L4 AND L5 AND (L6 OR L7)
L11             0 SEA L10 AND L8
L12             0 SEA L10 AND L9
L13         78421 SEA SEPARAT!R?
L14         18710 SEA L4 AND L13
L15           195 SEA L14 AND L8
L16             2 SEA L14 AND L9
L17             2 SEA L15 AND L5
L18           130 SEA L15 AND L6
L19            56 SEA L15 AND L7
L20            52 SEA L18 AND L19

     FILE 'HCAPLUS' ENTERED AT 10:45:57 ON 26 OCT 2007
L21           434 SEA IMACHI ?/AU
L22         20722 SEA YOSHIMURA ?/AU
L23          2059 SEA FUJITANI ?/AU
L24             6 SEA L21 AND L22 AND L23

     FILE 'HCA' ENTERED AT 10:56:23 ON 26 OCT 2007
L25         10395 SEA OVERCHARG? OR OVERDISCHARG? OR OVER?(2A)(CHARG? OR
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                DISCHARG?)
L26         2873 SEA MELTDOWN? OR MELT?(2A)DOWN?
L27          366 SEA L4 AND L13 AND L25
L28           42 SEA L4 AND L13 AND L26
L29           19 SEA L27 AND L5
L30           55 SEA L27 AND L6
L31           31 SEA L27 AND L7
L32           20 SEA L30 AND L31
L33            1 SEA L28 AND L5
L34           28 SEA L28 AND L6
L35            9 SEA L28 AND L7
L36            7 SEA L34 AND L35
L37           52 SEA L20 AND L15

     FILE 'REGISTRY' ENTERED AT 11:02:26 ON 26 OCT 2007
L38         9432 SEA (LI (L) MN (L) O)/ELS

     FILE 'HCA' ENTERED AT 11:02:41 ON 26 OCT 2007
L39         9821 SEA L38
L40            2 SEA L15 AND L39
L41           11 SEA L16 OR L17 OR L33 OR L36 OR L40
L42           36 SEA (L29 OR L32) NOT L41
L43           41 SEA (L20 OR L37) NOT (L41 OR L42)
L44          237 SEA (SHUTDOWN? OR SHUT?(2A)DOWN?)(3A)(TEMP# OR TEMPERATUR
                 E?)
L45           71 SEA L15 AND L44
L46           52 SEA L45 NOT (L41 OR L42 OR L43)
L47           37 SEA L46 AND (L5 OR L6 OR L7 OR L39)
L48           15 SEA L46 NOT L47
L49           26 SEA 1840-2003/PY,PRY AND L42
L50           33 SEA 1840-2003/PY,PRY AND L43
L51           28 SEA 1840-2003/PY,PRY AND L47
L52            9 SEA 1840-2003/PY,PRY AND L48


=> FILE HCA
FILE 'HCA' ENTERED AT 11:15:24 ON 26 OCT 2007
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=> D L41 1-11 BIB ABS HITSTR HITIND

L41  ANSWER 1 OF 11  HCA  COPYRIGHT 2007 ACS on STN
AN   147:236267  HCA  Full-text
```

TI Method for production of microporous polyolefin films with improved **meltdown** property

IN Lee, Young-Keun; Rhee, Jang-Weon; Kang, Gwi-Gwon; Jung, In-Hwa; Lee, Je-An

PA S. Korea

SO U.S. Pat. Appl. Publ., 12pp.
CODEN: USXXCO

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2007190303	A1	20070816	US 2006-407631	20060420
	WO 2007094530	A1	20070823	WO 2006-KR1190	20060331

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

	US 2007190304	A1	20070816	US 2007-654450	20070117
PRAI	KR 2006-13923	A	20060214		
	US 2006-407631	A2	20060420		

AB The invention relates to a method for prodn. of microporous polyolefin films having improved **meltdown** property, thermal stability, which may be used for **battery separators**. A microporous polyolefin film is produced by melt-extruding a compn. comprising (a) 20-50% of a resin compn. comprised of 90-98% of polyethylene having a wt.-av. mol. wt. of (2-4)+105 with < 5% of mols. having a mol. wt. < 1+104 and < 5% of mols. having a mol. wt. > 1+106, and 2-10% of polypropylene having a wt.-av. mol. wt. of 3.0+104- 8.0+105 and a m.p. peak > 145°, and (b) 50-80% of a diluent, to obtain a sheet, stretching the sheet to obtain a film, extg. the diluent from the film, and heat-setting the film. The films are also characterized by

having a puncture strength > 0.14 N/μm, a permeability const. > 1.5+10-5 Darcy, a shutdown temp. < 140°, and a **meltdown** temp. > 160°.

IT **9002-88-4**, Polyethylene
(high-d.; method for prodn. of microporous polyolefin films with improved **meltdown** property)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

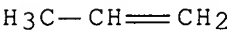
CRN 74-85-1
CMF C2 H4

IT **9003-07-0**, Polypropylene
(method for prodn. of microporous polyolefin films with improved **meltdown** property)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



INCL 428304400
CC 38-2 (Plastics Fabrication and Uses)
ST polyolefin blend melt extrusion microporous film **battery separator** prodn
IT Hydrocarbons, uses
(aliph. and alicyclic; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Fatty acids, uses
(esters; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Alcohols, uses
(fatty; method for prodn. of microporous polyolefin films with improved **meltdown** property)

IT Extrusion of plastics and rubbers
(melt; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Microporous materials
Plastic films
Secondary **battery separators**
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Fatty acids, uses
Paraffin oils
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Polyolefins
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Polymer blends
(of ethylene polymers and propylene polymers; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Extruded plastics
(thermoplastics; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT **9002-88-4**, Polyethylene
(high-d.; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT 57-10-3D, Palmitic acid, esters 57-11-4, Stearic acid, uses 57-11-4D, Stearic acid, esters 60-33-3, Linoleic acid, uses 60-33-3D, Linoleic acid, esters 84-74-2, Dibutyl phthalate 88-99-3D, Phthalic acid, esters 91-17-8, Decalin 101-84-8, Diphenyl ether 111-84-2, Nonane 112-80-1, Oleic acid, uses 112-80-1D, Oleic acid, esters 112-92-5, Stearic alcohol 117-81-7, Dioctyl phthalate 124-18-5, Decane 143-28-2, Oleic alcohol 463-40-1, Linolenic acid
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT **9003-07-0**, Polypropylene 9010-79-1, Ethylene-propylene copolymer 25087-34-7, 1-Butene-ethylene copolymer 25895-47-0, 1-Butene-ethylene-propylene copolymer
(method for prodn. of microporous polyolefin films with improved **meltdown** property)

L41 ANSWER 2 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 147:236266 HCA Full-text
TI Method for production of microporous polyolefin films with improved **meltdown** property
IN Lee, Young-Keun; Rhee, Jang-Weon; Kang, Gwi-Gwon; Jung, In-Hwa; Lee, Je-An

PA S. Korea
SO U.S. Pat. Appl. Publ., 12pp., Cont.-in-part of U.S. Ser. No. 407,631.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2007190304	A1	20070816	US 2007-654450	20070117
	US 2007190303	A1	20070816	US 2006-407631	20060420
PRAI	KR 2006-13923	A	20060214		
	US 2006-407631	A2	20060420		

AB The invention relates to a method for prodn. of microporous polyolefin films having improved **meltdown** property, thermal stability, which may be used for **battery separators**. A microporous polyolefin film is produced by melt-extruding a compn. comprising (a) 20-50% of a resin compn. comprised of 90-98% of polyethylene having a wt.-av. mol. wt. of (2-4)+105 with < 5% of mols. having a mol. wt. < 1+104 and < 5% of mols. having a mol. wt. > 1+106, and 2-10% of polypropylene having a wt.-av. mol. wt. of 3.0+104- 8.0+105 and a m.p. peak > 145°, and (b) 50-80% of a diluent to obtain a sheet, stretching the sheet to obtain a film, extg. the diluent from the film, and heat-setting the film. The films are also characterized by having a puncture strength > 0.14 N/μm, a permeability const. > 1.5+10-5 Darcy, a shutdown temp. < 140°, and a **meltdown** temp. > 160°.

IT **9002-88-4**, Polyethylene
(high-d.; method for prodn. of microporous polyolefin films with improved **meltdown** property)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

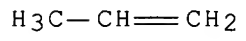
CM 1

CRN 74-85-1
CMF C2 H4

IT **9003-07-0**, Polypropylene
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



INCL 428304400
CC 38-2 (Plastics Fabrication and Uses)
ST polyolefin blend melt extrusion microporous film **battery separator** prodn
IT Hydrocarbons, uses
(aliph. and alicyclic; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Fatty acids, uses
(esters; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Alcohols, uses
(fatty; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Extrusion of plastics and rubbers
(melt; method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Microporous materials
Plastic films
Secondary **battery separators**
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Fatty acids, uses
Paraffin oils
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Polyolefins
(method for prodn. of microporous polyolefin films with improved **meltdown** property)
IT Polymer blends
(of ethylene polymers and propylene polymers; method for prodn. of microporous polyolefin films with improved **meltdown**

property)

IT Extruded plastics
(thermoplastics; method for prodn. of microporous polyolefin films with improved **meltdown** property)

IT **9002-88-4**, Polyethylene
(high-d.; method for prodn. of microporous polyolefin films with improved **meltdown** property)

IT 57-10-3D, Palmitic acid, esters 57-11-4, Stearic acid, uses 57-11-4D, Stearic acid, esters 60-33-3, Linoleic acid, uses 60-33-3D, Linoleic acid, esters 84-74-2, Dibutyl phthalate 88-99-3D, Phthalic acid, esters 91-17-8, Decalin 101-84-8, Diphenyl ether 111-84-2, Nonane 112-80-1, Oleic acid, uses 112-80-1D, Oleic acid, esters 112-92-5, Stearic alcohol 117-81-7, Dioctyl phthalate 124-18-5, Decane 143-28-2, Oleic alcohol 463-40-1, Linolenic acid
(method for prodn. of microporous polyolefin films with improved **meltdown** property)

IT **9003-07-0**, Polypropylene 9010-79-1, Ethylene-propylene copolymer 25087-34-7, 1-Butene-ethylene copolymer 25895-47-0, 1-Butene-ethylene-propylene copolymer
(method for prodn. of microporous polyolefin films with improved **meltdown** property)

L41 ANSWER 3 OF 11 HCA COPYRIGHT 2007 ACS on STN

AN 146:463423 HCA Full-text

TI Polyolefin multilayer microporous films with balanced permeability, mechanical strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**

IN Kikuchi, Shintaro; Takita, Kotaro

PA Tonen Chemical Corporation, Japan

SO PCT Int. Appl., 49pp.
CODEN: PIXXD2

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2007049568	A1	20070503	WO 2006-JP321084	20061023

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,

PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRAI JP 2005-308743 A 20051024
JP 2005-308744 A 20051024

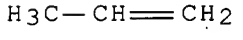
AB Title multilayer microporous films comprise a porous layer composed of a polyethylene resin and another porous layer contg. polypropylene and a heat-resistant resin with m.p. or glass transition temp. ≥170° or a porous layer composed of a polyethylene resin and another porous layer contg. polypropylene and an inorg. filler with aspect ratio ≥2. Thus, a polymer soln. comprising 30 parts a resin compn. comprising polyethylene 25, high d. polyethylene 75, and tetrakis[methylene-3-(3,5-di-tert-butyl-4- hydroxyphenyl)propionato]methane 0.2 parts and 70 parts paraffin wax and a heat-resistant polymer soln. comprising 30 parts a resin compn. comprising polypropylene 90, a polyamide 9, and an antioxidant 0.2 parts and 70 parts paraffin wax were coextruded into a three layer sheet, biaxially-stretched 5-folds each, soaked in methylene chloride, washed, dried, and heat-treated at 125° for 10 min to give a microporous polyolefin laminate, showing air permeability 260 s/100 cm3/20 μm, porosity 45%, piercing strength 4116 mN/20 μm, tensile strength 129,360 kPa in the machine direction (MD) and 109,760 kPa in the transverse direction (TD), tensile elongation 140% in the MD and 130% in the TD, heat shrinkage 3% in the MD and 4% in the TD, shutdown temp. 135°, **meltdown** temp. 175°, and good compression resistance.

IT **9003-07-0**, Polypropylene
(blend with polyamide or polyester, surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

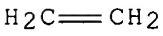
CRN 115-07-1
CMF C3 H6



IT **9002-88-4**, Polyethylene
(core layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST polyolefin multilayer microporous film balanced permeability mech strength; thermal shrinkage resistance shutdown **meltdown** characteristic **battery separator**; polyethylene blend core layer; polypropylene polyamide blend surface layer
IT Polyesters, uses
(blend with polypropylene, surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)
IT Glass fibers, uses
(filler contg. in surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)
IT Porous materials
(films; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)
IT Fillers
(inorg., contg. in surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)
IT Films

(multilayer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Extrusion of plastics and rubbers
Fuel cell **separators**
Primary **battery separators**
Secondary **battery separators**
(polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Polyamides, uses
(polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Polyolefins
(polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Polymer blends
(polypropylene-polyamide blends, surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Films
(porous; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT Mica-group minerals, uses
(white, A 11, filler contg. in surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT 26062-94-2, Polybutylene terephthalate
(assumed monomers, blend with polypropylene, surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT **9003-07-0**, Polypropylene
(blend with polyamide or polyester, surface layer; polyolefin

multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT 24968-12-5, Polybutylene terephthalate 25038-54-4, Polyamide 6, uses 25038-59-9, uses
(blend with polypropylene, surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT **9002-88-4**, Polyethylene
(core layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

IT 14807-96-6, Himicron HE 5, uses
(filler contg. in surface layer; polyolefin multilayer microporous films with balanced permeability, mech. strength, thermal shrinkage resistance, and shutdown and **meltdown** characteristics for **battery separators**)

RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 4 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 144:415803 HCA Full-text
TI Study of overcharge characteristics of lithium-ion **batteries**
AU Pang, Jing; Lu, Shi-gang; Liu, Sha
CS General Research Institute for Nonferrous Metals, Beijing, 100088, Peop. Rep. China
SO Dianhuaxue (2005), 11(4), 398-401
CODEN: DIANFX; ISSN: 1006-3471
PB Dianhuaxue Bianjibu
DT Journal
LA Chinese
AB The overcharge characteristics and effect factors of lithium-ion **batteries** contg. LiMn2O4 cathodes were studied. Overcharge testing of lithium-ion **batteries** with a systematic variation in the **battery** balance demonstrated that the overcharge characteristics of lithium-ion **batteries** were affected by the amt. of cathode in the **batteries**, and are independent of the amt. of anode material. The rate of charge was found to be an important parameter, as electrolyte complete decompn. at low charge rates caused the end of overcharge testing, while high charge rates accelerated the rate of heat generation in the **batteries** and the **battery** temp. increased as a result of insufficient heat dissipation. The **battery** temp. increase led to the **separator shut down** and end of testing.

IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)

(overcharge characteristics of lithium-ion **batteries** with cathode of)
RN 12057-17-9 HCA
CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium ion **battery** overcharge lithium manganese oxide cathode
IT Secondary **batteries**
(overcharge characteristics of lithium-ion **batteries**)
IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)
(overcharge characteristics of lithium-ion **batteries** with cathode of)

L41 ANSWER 5 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 144:153401 HCA Full-text
TI Nonaqueous electrolyte **battery**
IN Imachi, Naoki; Takano, Yasuo; Yoshimura, Seiji; Fujitani, Shin
PA Japan
SO U.S. Pat. Appl. Publ., 17 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2006019153	A1	20060126	US 2005-184933	20050720
	JP 2006032279	A	20060202	JP 2004-213111	20040721
	CN 1725549	A	20060125	CN 2005-10086062	20050719
	KR 2006053914	A	20060522	KR 2005-65579	20050720
PRAI	JP 2004-213111	A	20040721		

AB A non-aq. electrolyte **battery** that is capable of improving safety, particularly tolerance of the **battery** for overcharging, is furnished with a pos. electrode including a pos. electrode active material-layer contg. a plurality of pos. electrode active materials and being formed on a surface of a pos. electrode current collector, a neg. electrode including a neg. electrode active material layer, and a **separator** interposed between the electrodes. The pos. electrode active material-layer is composed of two layers and having different pos. electrode active materials, and of the two layers, the layer that is an outer layer contains as its main active material a pos. electrode active material having the highest thermal stability among the pos. electrode active materials. The **meltdown** temp. of the **separator** (3) is 180° C. or higher.

IT **39457-42-6**, Lithium manganese oxide
(nonaq. electrolyte **battery** with excellent safety on overcharge)

RN 39457-42-6 HCA

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

INCL 429128000; 429062000; 429224000; 429231100; 429231300; 429144000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** nonaq electrolyte safety

IT Secondary **batteries**
(lithium; nonaq. electrolyte **battery** with excellent safety on overcharge)

IT Polyamides, uses
Polyimides, uses
(nonaq. electrolyte **battery** with excellent safety on overcharge)

IT Polyimides, uses
(polyamide-; nonaq. electrolyte **battery** with excellent safety on overcharge)

IT Polyamides, uses
(polyimide-; nonaq. electrolyte **battery** with excellent safety on overcharge)

IT 7429-90-5, Aluminum, uses 9002-88-4, Polyethylene **39457-42-6**, Lithium manganese oxide 52627-24-4, Cobalt lithium oxide
(nonaq. electrolyte **battery** with excellent safety on overcharge)

L41 ANSWER 6 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 141:298754 HCA Full-text
TI Nonaqueous electrolyte **battery**
IN Imachi, Naoki; Yoshimura, Seiji; Fujitani, Shin
PA Japan
SO U.S. Pat. Appl. Publ., 20 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004191611	A1	20040930	US 2004-809875	20040326
	JP 2004303474	A	20041028	JP 2003-92311	20030328
	JP 2004303475	A	20041028	JP 2003-92312	20030328
	CN 1534821	A	20041006	CN 2004-10030224	20040322
	KR 2004084981	A	20041007	KR 2004-20561	20040326
PRAI	JP 2003-92311	A	20030328		
	JP 2003-92312	A	20030328		

AB The invention provides a non-aq. electrolyte **battery** characterized in that: an active material of the pos. electrode includes lithium manganese oxide; the **shut-down** temp. of the **separator** is 162° or lower; and the **area contraction ratio** of the **separator** at 120° is 15% or less.

IT **12057-17-9**, Lithium manganese oxide limn2o4
39457-42-6, Lithium manganese oxide
(nonaq. electrolyte **battery**)
RN 12057-17-9 HCA
CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5

Li	1	7439-93-2

RN 39457-42-6 HCA
CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M010-50
ICS H01M004-52; H01M004-50
INCL 429062000; 429224000; 429231500; 429231300; 429223000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST nonaq electrolyte **battery**
IT Secondary **batteries**
(lithium; nonaq. electrolyte **battery**)
IT Carbon black, uses
(nonaq. electrolyte **battery**)
IT Fluoropolymers, uses
(nonaq. electrolyte **battery**)
IT Styrene-butadiene rubber, uses
(nonaq. electrolyte **battery**)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 7782-42-5, Graphite, uses **12057-17-9**, Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide colio2 21324-40-3, Lithium hexafluorophosphate **39457-42-6**, Lithium manganese oxide 113066-89-0, Cobalt lithium nickel oxide co0.2lini0.8o2
(nonaq. electrolyte **battery**)
IT 24937-79-9, Pvdf
(nonaq. electrolyte **battery**)
IT 9003-55-8
(styrene-butadiene rubber; nonaq. electrolyte **battery**)

L41 ANSWER 7 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 141:108881 HCA Full-text
TI Microporous polyolefin membranes, their manufacture, and use for **battery separators**
IN Kobayashi, Shigeaki; Kaimai, Norimitsu; Kimishima, Kotaro; Suzuki, Sadakatsu
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXXAF
DT Patent

LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004196871	A	20040715	JP 2002-364147	200212 16

PRAI JP 2002-364147 20021216

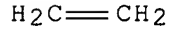
AB Polyethylene, polypropylene [Mw ≥5 + 105, m.p. (measured by DSC at temp. rising rate 3-20°/min) ≥163°], and solvents are kneaded, the resulting mixts. are extruded through a die, cooled, and the resulting gel sheets are stretched, while removing the solvents before or after stretching, to give microporous polyolefin membranes suitable for **battery separators**. The microporous membranes show uniform thickness, high gas permeability, high mech. strength, low thermal shrinkage, and good shutdown and **meltdown** characteristics.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

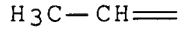
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-00

ICS C08L023-04; C08L023-10; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST microporous polyolefin membrane manuf batter **separator**; polyethylene polypropylene microporous membrane **battery separator**
IT Primary **battery separators**
Secondary **battery separators**
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)
IT Polymer blends
Polyolefins
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)
IT Membranes, nonbiological
(microporous; manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

L41 ANSWER 8 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 141:108880 HCA Full-text
TI Microporous polyolefin membranes, their manufacture, and use for **battery separators**
IN Kobayashi, Shigeaki; Kaimai, Norimitsu; Kimishima, Kotaro; Suzuki, Sadakatsu
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2004196870	A	20040715	JP 2002-364146	200212 16
PRAI JP 2002-364146		20021216		

AB Polyethylene, polypropylene [Mw ≥5 + 105, heat of fusion (measured by DSC) ≥90 J/g], and solvents are kneaded, the resulting mixts. are extruded through a die, cooled, and the resulting gel sheets are stretched, while removing the solvents before or after stretching, to give microporous polyolefin membranes suitable for **battery separators**. The microporous membranes show uniform thickness, high

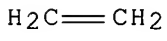
gas permeability, high mech. strength, low thermal shrinkage, and good shutdown and **meltdown** characteristics.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

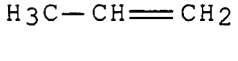
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-00
ICS B01D071-26; C08L023-06; C08L023-12; H01G009-02; H01M002-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST microporous polyolefin membrane manuf batter **separator**; polyethylene polypropylene microporous membrane **battery separator**

IT Primary **battery separators**
Secondary **battery separators**
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

IT Polymer blends
Polyolefins
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

IT Membranes, nonbiological

(microporous; manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of microporous polyolefin membranes contg. polyethylene and polypropylene for **battery separators**)

L41 ANSWER 9 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 134:240107 HCA Full-text
TI Polyolefin porous membranes and their manufacture for **battery separators** and filters
IN Takita, Kotaro; Funaoka, Hidehiko; Kaimai, Norimitsu; Kobayashi, Shigeaki; Kono, Koichi
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

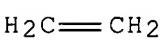
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001072788	A	20010321	JP 1999-251748	19990906
PRAI JP 1999-251748		19990906		

AB The membranes are manufd. from solns. contg. 10-50 wt.% polyolefin compns. contg. (A) wt. av. mol. wt. ≥500,000 polyethylene or its compn. with wt. av. mol. wt. ≥10,000 and <500,000 polyethylene, (B) straight chain ethylene-α-olefin copolymer manufd. by using single site catalysts having m.p. 95-125°, and (C) polypropylene and 50-90 wt.% solvents by die extruding, cooling to give gelled compns., drawing at temp. lower than m.p. of the compns. + 10°, and then removing solvents or removing solvents before or during the drawing. Resulting polyolefin porous membranes are also claimed. **Battery separators** using the membranes and resulting **batteries** are also claimed. Filters using the membranes are also claimed. The membranes have low-temp. shut down and high-temp. **melt down** characteristics, small pore size, high strength, and low thermal shrinkage.

IT **9002-88-4**, HDPE **9003-07-0**, Polypropylene
(polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

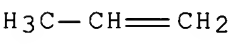
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 47
ST polyolefin polyethylene polypropylene porous membrane manuf drawing **battery separator**; filter polyolefin porous membrane manuf extrusion; metallocene catalyst polyolefin porous membrane manuf
IT Molding of plastics and rubbers
(drawing; polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
IT Secondary **batteries**
(lithium; polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
IT Polymerization catalysts
(metallocene; polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
IT Filters
Secondary **battery separators**
(polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
IT Polyolefins
(polyolefin porous membranes manufd. by drawing for **battery separators** and filters)
IT 26221-73-8, Affinity PL 1880
(metallocene catalyzed; polyolefin porous membranes manufd. by

drawing for **battery separators** and filters)

IT **9002-88-4**, HDPE **9003-07-0**, Polypropylene
(polyolefin porous membranes manufd. by drawing for **battery separators** and filters)

L41 ANSWER 10 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 134:150091 HCA Full-text
TI Square non-aqueous electrolytic secondary **battery** comprising bag type **separator**
IN Kojima, Akira; Ishizu, Takeshi
PA Shin-Kobe Electric Machinery Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001035472	A	20010209	JP 1999-202891	19990716

PRAI JP 1999-202891 19990716

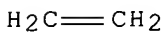
AB The non-aq. electrolytic secondary **battery** comprises a **separator** made of ≥2 different **separator** materials with different thermal properties and so formed in a bag-like shape as to contain either a cathode plate or an anode plate and as to surround either one electrode plate with a single **separator** material. Shut **down** and **melt down** temp. can be made different corresponding to the heat generation quantity of either the cathode plate or the anode plate to cause shut down in a low heat generation level to prevent **melt down** and provide a high safety **battery**.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** material; secondary **battery** comprising **separator** made of different materials for wide shut **down** and **melt down** temp. difference)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

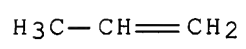
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-18
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **separator** bag layer structure **battery** safety
IT Secondary **batteries**
(non-aq. electrolytic; secondary **battery** comprising **separator** made of different materials for wide shut **down** and **melt down** temp. difference)
IT Secondary **battery separators**
(secondary **battery** comprising **separator** made of different materials for wide shut **down** and **melt down** temp. difference)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** material; secondary **battery** comprising **separator** made of different materials for wide shut **down** and **melt down** temp. difference)

L41 ANSWER 11 OF 11 HCA COPYRIGHT 2007 ACS on STN
AN 125:334113 HCA Full-text
TI Sealed lead **battery** with improved glass fiber **separator**
IN Ide, Masayuki; Inoe, Toshihiro
PA Matsushita Electric Ind Co Ltd, Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI JP 08236143 A 19960913 JP 1995-35206 199502 23

PRAI JP 1995-35206 19950223

AB A glass fiber **separator** in a Pb **battery** is folded to a M-like shape with the cathode being inserted in the central fold which is open upward. The **contraction ratio** of the **separator** under a pressure of 20 kg/cm2 is ≥1.10. An oxidn.-resistant sheet having ion permeability, e.g. polyethylene, is inserted in the folds which are opened downward. A **separator** with a U-shape configuration is also claimed. The degrdn. of high-rate discharge characteristic is prevented and a **battery** with improved trickle charge life is obtained.

IC ICM H01M010-12
ICS H01M002-16; H01M002-18

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lead **battery** glass fiber **separator**

IT Glass fibers, uses
(sealed lead **battery** with improved glass fiber **separator**)

IT **Batteries**, secondary
(**separators**, sealed lead **battery** with improved glass fiber **separator**)

IT 9002-88-4, Polyethylene
(in sealed lead **battery** with improved glass fiber **separator**)

=> D L49 1-26 BIB ABS HITSTR HITIND

L49 ANSWER 1 OF 26 HCA COPYRIGHT 2007 ACS on STN

AN 145:191948 HCA Full-text

TI **Separator** for lithium **battery** with improved electrical stability and lithium secondary **battery** employing the **separator**

IN Choi, Sang Hun

PA Samsung Sdi Co., Ltd., S. Korea

SO Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7

DT Patent

LA Korean

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI KR 2004046647	A	20040605	KR 2002-74637	

<--

PRAI KR 2002-74637 20021128 <--

AB A **separator** for a lithium **battery** and a lithium secondary **battery** employing the **separator** are provided, to improve elec. stability, thereby preventing the shortage by **overcharge** or puncture due to the growth of dendrite. The **separator** is a porous membrane of a single layer or multi-layer structure made of polyethylene or polypropylene. The **separator** has a puncture strength of 400-800 gf, a transverse direction tensile strength of 1000-3000 kg/cm2, a longitudinal direction tensile strength of 1000-2000 kg/cm2, a transverse direction tensile modulus of 100-200%, a longitudinal direction tensile modulus of 100-300%, a transverse direction heat shrinkage of 1-10%, and a longitudinal direction heat shrinkage of 1-10%.

IT **9002-88-4 9003-07-0**
(**separator** for lithium **battery** with improved elec. stability and lithium secondary **battery** employing **separator**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

IC ICM H01M002-14
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 35, 49

ST lithium **battery separator** polyethylene polypropylene

IT Secondary **batteries**
(lithium, **separators; separator** for lithium **battery** with improved elec. stability and lithium secondary **battery** employing **separator**)

IT 7439-93-2, Lithium, uses **9002-88-4 9003-07-0**
(**separator** for lithium **battery** with improved elec. stability and lithium secondary **battery** employing **separator**)

L49 ANSWER 2 OF 26 HCA COPYRIGHT 2007 ACS on STN

AN 143:46075 HCA Full-text

TI Secondary lithium **battery**

IN Mitani, Takayuki; Suzuki, Katsunori

PA Shin-Kobe Electric Machinery Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2005158627	A	20050616	JP 2003-398385	200311 28

<--

PRAI JP 2003-398385 20031128 <--

AB The **battery** has a **separator** between a cathode, comprising a Li transition metal oxide-contg. cathode mixt., and an anode and a nonaq. electrolyte soln. impregnated in the electrode- **separator** stack; where the cathode mixt. contains a specified amt. of dendritic particles of an alloy or ≥1 metal, selected from Fe, Cu, Ag, and/or Au, deposited on the anode surface during **overcharge**; and the **battery** satisfies a/b ≥0.75 (a = particle size of particles; and b = thickness of **separator**).

IT **39457-42-6**, Lithium manganese oxide
(cathode mixts. contg. alloy or metal powders for secondary lithium **batteries**)

RN 39457-42-6 HCA

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number

O		x	17778-80-2
Mn		x	7439-96-5
Li		x	7439-93-2

IC ICM H01M004-02
ICS H01M002-16; H01M004-62; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary **battery** cathode lithium transition metal oxide **overcharge** safety
IT **Battery** cathodes
Safety
(cathode mixts. contg. alloy or metal powders for secondary lithium **batteries**)
IT Secondary **batteries**
(lithium; cathode mixts. contg. alloy or metal powders for secondary lithium **batteries**)
IT **39457-42-6**, Lithium manganese oxide
(cathode mixts. contg. alloy or metal powders for secondary lithium **batteries**)
IT 7440-22-4, Silver, uses 7440-57-5, Gold, uses 11122-26-2 11136-88-2 11148-05-3 11148-32-6 12649-48-8
(cathode mixts. contg. alloy or metal powders for secondary lithium **batteries**)

L49 ANSWER 3 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 142:301077 HCA Full-text
TI Nonaqueous electrolyte lithium secondary **batteries**
IN Amazutsumi, Toru; Morita, Seiji; Nishiguchi, Nobuhiro; Kita, Katsuyuki; Minamida, Yoshitaka; Kitayoshi, Masanori
PA Sanyo Electric Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2005085508	A	20050331	JP 2003-313216	20030904 <--

PRAI JP 2003-313216 20030904 <--
AB The **batteries** consist of Li-intercalating metal oxide cathode active material and Li-intercalating metal oxide or carbonaceous anode active material, with the cathode and the anode contacted with Li (alloys). The **battery** having a structure consisting of a nonaq.

electrolyte-impregnated **separator** successively sandwiched in between the said cathode and the anode, a pair of Li (alloys), and the cathode collector and the anode collector is also claimed. **Batteries** with prevented **overcharging** and **overdischarging** can be be manufd. without carrying out pre-charging or pre-discharging processes.

IT **39457-42-6**, Lithium manganese oxide
(cathode active material; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging** /-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

RN 39457-42-6 HCA

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M010-40
ICS H01M004-02; H01M004-48; H01M004-58; H01M004-64

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium nonaq secondary **battery**

IT Carbonaceous materials (technological products)
(anode active material; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging** /-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT Secondary **batteries**
(lithium; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging**/-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT Lithium alloy, base
(nonaq. electrolyte Li secondary **batteries** with prevented **over-charging**/-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT 178958-56-0, Lithium silicon oxide
(anode active material; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging** /-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT 11126-15-1, Lithium vanadium oxide 37296-91-6, Lithium molybdenum oxide **39457-42-6**, Lithium manganese oxide
(cathode active material; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging**

/-**discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT 1313-96-8, Niobium pentaoxide 39302-37-9, Lithium titanium oxide (cathode or anode active material; nonaq. electrolyte Li secondary **batteries** with prevented **over-charging/-discharging** by insertion of Li (alloys) contacting anodes and cathodes)

IT 7439-93-2, Lithium, uses (nonaq. electrolyte Li secondary **batteries** with prevented **over-charging/-discharging** by insertion of Li (alloys) contacting anodes and cathodes)

L49 ANSWER 4 OF 26 HCA COPYRIGHT 2007 ACS on STN

AN 142:264355 HCA Full-text

TI Rechargeable bipolar high power electrochemical device with reduced monitoring requirement

IN Desilvestro, Hans; Van Veen, Casey Ann; Jiang, Nancy Lan; Ammundsen, Brett

PA Pacific Lithium New Zealand Limited, N. Z.

SO PCT Int. Appl., 31 pp.
CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005018038	A2	20050224	WO 2004-EP9183	200408 16
			<--	
WO 2005018038	A3	20060302		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2007042264	A1	20070222	US 2006-568129	200611 03

PRAI US 2003-495324P P 20030815 <--
WO 2004-EP9183 W 20040816

AB The present invention is drawn to a high power electrochem. energy storage device in a bipolar configuration, comprising at least n stackable cells in bipolar configuration wherein subgroups of m cells are electronically monitored. The storage cells have a lithium ion insertion anode and a lithium ion insertion cathode, a **separator**, an electrolyte system, and a leak-proof seal structure. A no. of embodiments are disclosed, characterized by a favorable range of m values, in combination with the anode-to-cathode capacity ratio, electrolyte cond., and other **battery** key features, thereby providing a high power device providing long cycle life and excellent power performance **over** many thousand **charge** and discharge cycles while minimizing the cost for electronic monitoring. Addnl., the present invention is drawn to a device combining two or more groups of stackable cells in bipolar configuration, either in series or in parallel or any combination thereof, so as to create a high power, high voltage energy storage device.

IT **39457-42-6**, Lithium manganese oxide
(rechargeable bipolar high power electrochem. device with reduced monitoring requirement)

RN 39457-42-6 HCA

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M010-04
ICS H01M010-40; H01M010-48; H01M002-08; H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ST **battery** rechargeable bipolar high power low monitoring requirement

IT Secondary **batteries**
(lithium; rechargeable bipolar high power electrochem. device with reduced monitoring requirement)

IT 96-48-0, γ-Butyrolactone 96-49-1, Ethylene carbonate 105-37-3, Ethyl propionate 105-54-4, Ethyl butyrate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 110-59-8, Valeronitrile 110-71-4, 1,2-Dimethoxyethane 111-96-6, 2-Methoxyethyl ether 126-33-0, Sulfolane 127-19-5, Dimethyl acetamide 141-78-6, Ethyl acetate, uses 512-56-1, Trimethyl

phosphate 616-38-6, Dimethyl carbonate 616-42-2, Dimethyl sulfite 623-42-7, MEthyl butyrate 623-53-0, Ethyl methyl carbonate 623-81-4, Diethyl sulfite 685-91-6 7791-03-9, Lithium perchlorate 12031-95-7, Lithium titanium oxide (Li4Ti5O12) 12676-27-6 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 26856-69-9, Methoxypropionitrile 28516-43-0, Surlyn 1652 29935-35-1, Lithium hexafluoroarsenate 39302-37-9, Lithium titanium oxide **39457-42-6**, Lithium manganese oxide 90076-65-6 132404-42-3 132843-44-8 244761-29-3, Lithium bisoxalatoborate 845718-77-6, Chromium lithium manganese oxide (Cr0.1Li1.05Mn1.9O4)
(rechargeable bipolar high power electrochem. device with reduced monitoring requirement)

L49 ANSWER 5 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 142:117619 HCA Full-text
TI Lithium secondary **battery**
IN Han, Se Jong; Kim, Gi Ho; Noh, Hyeong Gon
PA Samsung SDI Co., Ltd., S. Korea
SO Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7
DT Patent
LA Korean
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
KR 2002023489	A	20020329	KR 2000-55751	20000922

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PRAI KR 2000-55751 20000922 <--

AB The title **battery** comprises a cathode of Li composite metal oxides such as LiMn2O4, LiNiO2 and LiCoO2 and an anode of Li or Li alloy or carbonaceous material such as carbon or graphite; an electrode assembly being composed of a highly porous **separator** of roll-type or multiplex-type between two electrodes, the **separator** being polyethylene, polypropylene or their mixt.; the electrolyte contg. Li salt and non aq. org. solvent; and the assembly being sealed with 0.2-5g of Me or Et 2-cyanoacrylate at the top to bottom. The **battery** is superior in stability against expansion or explosion due to inner pressure increasing when the **battery** is **over charged** or left at high temp. for a long time.

IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)
(lithium secondary **battery**)
RN 12057-17-9 HCA
CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

IC ICM H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium secondary **battery**
IT **Battery** cathodes
Secondary **batteries**
(lithium secondary **battery**)
IT Secondary **batteries**
(lithium; lithium secondary **battery**)
IT 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 9003-07-0 12031-65-1, Lithium nickel oxide (LiNiO2) **12057-17-9**, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium oxide (CoLiO2)
(lithium secondary **battery**)

L49 ANSWER 6 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 141:352740 HCA Full-text
TI Surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling
IN Morris, Robert Scott; Dixon, Brian Gilbert
PA Phoenix Innovations, Inc., USA
SO PCT Int. Appl., 21 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2004088769	A2	20041014	WO 2004-US3750	20040209
			<--	
WO 2004088769	A3	20050203		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,

VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

EP 1597783 A2 20051123 EP 2004-709487 200402 09 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK

JP 2006520082 T 20060831 JP 2006-508704 200402 09 <--

US 2007015053 A1 20070118 US 2006-546416 200608 11 <--

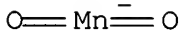
PRAI US 2003-447500P P 20030219 <--
WO 2004-US3750 W 20040209

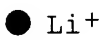
AB Novel lithium **batteries** with improved interfacial contact and decreased impedance between the electrolyte and the electrodes, resulting in improved safety (esp. to prevent **overcharging** during cycling) are characterized by having one or both surfactant-modified electrodes, a porous **separator**, and an electrolyte. The anode is esp. a carbon anode (e.g., graphite, mesocarbon microbeads, buckyballs, and multiwall and single-walled carbon nanotubes) that is coated with a fluorinated, nonionic, or cationic surfactant; the cathode is esp. a lithium metal oxide (e.g., LiNiCoO2, LiCoO2, LiNO2, and LiMnO2) coated with a fluorinated, dimeric, cationic, or nonionic surfactant. All the surfactants have an incorporated reactive end group of various reactive functionality (e.g., vinyl, allyl, acrylate, propargyl, diene, polyene, etc). The electrolytes include nonaq. org. electrolytes and can incorporate added lithium salts.

IT **12162-79-7**, Lithium manganese oxide (LiMnO2)
(cathodes; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

RN 12162-79-7 HCA

CN Manganate (MnO21-), lithium (9CI) (CA INDEX NAME)





IC ICM H01M
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 46
ST solid electrolyte interface lithium **battery** electrode surfactant; surfactant treated anode cathode electrolyte interface **battery** safety; carbon anode surfactant lithium **battery** electrolyte interface
IT Polysiloxanes, uses
(Silwet L 7510, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Surfactants
(anionic; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Fullerenes
(anodes; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Nanotubes
(carbon, single-walled and multiwalled; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Surfactants
(cationic; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Polysiloxanes, uses
(di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol mono-Me ether, Silwet L 7602 and Silwet L 7622; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Polysiloxanes, uses
(di-Me, 3-hydroxypropyl Me, ethers with polyethylene-polypropylene glycol mono-Me ether, Silwet L 7001 and Silwet L 7605; surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)
IT Polysiloxanes, uses
(di-Me, 3-hydroxypropyl Me, ethoxylated propoxylated, Silwet L

7280 and Silwet L 7607; surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polysiloxanes, uses
(di-Me, 3-hydroxypropyl Me, ethoxylated, Silwet L 7608; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polyoxyalkylenes, uses
(di-Me, Me hydrogen polysiloxane-, Silwet L 7600, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polysiloxanes, uses
(di-Me, Me hydrogen, polyoxyalkylene-, Silwet L 7600, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polysiloxanes, uses
(di-Me, hydroxyalkyl Me, ethers with polyalkylene glycol mono-C1-3-alkyl ether, Silwet L 7500, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polysiloxanes, uses
(di-Me, hydroxypropyl Me, ethers with polyoxyalkylene glycol mono-C1-3-alkyl ether, Silwet L 7604, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polyphosphates
(electrolyte contg.; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Glycols, uses
(ethers, alkyl and aryl ethers, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Surfactants
(fluorosurfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Ethers, uses
(glycol, alkyl and aryl ethers, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Safety
(in **battery** cycling; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Microspheres

(mesocarbon; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Surfactants
(nonionic; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polysiloxanes, uses
(polyoxyalkylene-, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polyoxyalkylenes, uses
(polysiloxane-, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Carboxylic acids, uses
Sulfonic acids, uses
(salts, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT **Battery** anodes
Battery cathodes
Battery electrodes
Electrode-electrolyte interface
Surfactants
(surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Polyoxyalkylenes, uses
(surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT Phosphonium compounds
Polyoxyarylenes
Quaternary ammonium compounds, uses
(surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 9002-92-0
(Brij 30 and Brij 35, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 9004-95-9
(Brij 52 and Brij 58, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 9005-00-9
(Brij 700, Brij 72, Brij 76; surfactants; surfactant-treated lithium **battery** electrodes for improved solid

electrolyte interface during cycling)

IT 9004-98-2
(Brij 92, Brij 97, Brij 98; surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 112-34-5
(Dowanol DB, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 111-77-3
(Dowanol DM, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 34590-94-8
(Dowanol DPM, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 88917-22-0
(Dowanol DPMA, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 35884-42-5
(Dowanol DPNB, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 29911-27-1
(Dowanol DPNP, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 111-76-2
(Dowanol EB, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 122-99-6
(Dowanol EPH, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 1320-67-8
(Dowanol PM, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 29387-86-8
(Dowanol PNB, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 30136-13-1
(Dowanol PNP, surfactants; surfactant-treated lithium

battery electrodes for improved solid electrolyte interface during cycling)

IT 41593-38-8
(Dowanol PPH, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 25498-49-1
(Dowanol TPM, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 55934-93-5
(Dowanol TPNB, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 9002-93-1
(Triton X 100 and Triton X 114, surfactants; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses
(anodes; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 12031-65-1, Lithium nickel oxide (LiNiO2) **12162-79-7**, Lithium manganese oxide (LiMnO2) 12190-79-3, Cobalt lithium oxide (CoLiO2) 162004-08-2, Cobalt lithium nickel oxide ((Co,Li,Ni)O2)
(cathodes; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 123-91-1, 1,4-Dioxane, uses 126-33-0, Sulfolane 512-56-1, Trimethyl phosphate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 756-79-6, Dimethyl methyl phosphonate 872-36-6, Vinylene carbonate 7791-03-9, Lithium perchlorate 13598-36-2D, Phosphonic acid, polymers 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 25322-68-3, Polyethylene glycol 25322-69-4, Polypropylene glycol 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium trifluoromethanesulfonate 132843-44-8 288570-49-0
(electrolyte contg.; surfactant-treated lithium **battery** electrodes for improved solid electrolyte interface during cycling)

IT 57-09-0, Cetyltrimethylammonium bromide 112-02-7, Cetyltrimethylammonium chloride 151-21-3, Sodium dodecylsulfate, uses 7664-38-2D, Phosphoric acid, salts 13598-36-2D, Phosphonic acid, derivs., salts 27306-78-1, Silwet L 77 67674-67-3 166949-53-7 193487-14-8, Silwet 560 296241-24-2, Silwet 806
(surfactants; surfactant-treated lithium **battery**

electrodes for improved solid electrolyte interface during cycling)

L49 ANSWER 7 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 141:143277 HCA Full-text
TI Carbon compound-adsorbed cathode active material for lithium **battery**
IN Choi, Young-Min; Ham, Yong-Nam; Park, Jung-Joon
PA Samsung SDI Co., Ltd., S. Korea
SO U.S. Pat. Appl. Publ., 11 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 2004157127	A1	20040812	US 2004-772290	20040206
			<--	
KR 2004071852	A	20040816	KR 2003-7759	20030207
CN 1519966	A	20040811	CN 2004-10001811	20040114
			<--	
JP 2004241390	A	20040826	JP 2004-29806	20040205
			<--	
PRAI KR 2003-7759	A	20030207 <--		

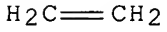
AB A cathode active material is prepd. by mixing a transition metal compd. and a lithium compd. in a molar ratio of 1:1.0-1:1.2 and thermally treating the mixt. while supplying CO2 and O2 in a ratio of partial pressures ranging from 1:0.001-1:1,000, and a lithium **battery** utilizes the cathode active material. The lithium **battery** ensures safety against **over- charging** because an **overflow** of current may be effectively cut off without reducing discharging capacity and cycle life characteristics.
IT **12057-17-9**, Lithium manganese oxide limn2o4
(carbon compd.-adsorbed cathode active material for lithium **battery**)
RN 12057-17-9 HCA
CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; carbon compd.-adsorbed cathode active material for lithium **battery**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

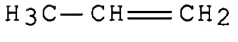
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M004-48
ICS H01M004-52; H01M004-50; H01M004-58
INCL 429231800; 252182100; 429231100; 429061000; 429223000; 429221000; 429224000; 429231300
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST carbon compd adsorbed cathode active material lithium **battery**; safety carbon compd adsorbed cathode active material lithium **battery**
IT **Battery** cathodes
(carbon compd.-adsorbed cathode active material for lithium **battery**)

IT Fluoropolymers, uses
(carbon compd.-adsorbed cathode active material for lithium **battery**)
IT Transition metal compounds
(hydroxides; carbon compd.-adsorbed cathode active material for lithium **battery**)
IT Transition metal oxides
(lithiated; carbon compd.-adsorbed cathode active material for lithium **battery**)
IT Secondary **batteries**
(lithium; carbon compd.-adsorbed cathode active material for lithium **battery**)
IT Glass fibers, uses
Polyesters, uses
(**separator**; carbon compd.-adsorbed cathode active material for lithium **battery**)
IT Hydroxides (inorganic)
(transition metal; carbon compd.-adsorbed cathode active material for lithium **battery**)
IT 64-19-7D, Acetic acid, transition metal compds. 463-79-6D, Carbonic acid, transition metal compds. 546-89-4, Lithium acetate 554-13-2, Lithium carbonate 1310-65-2, Lithium hydroxide 7440-44-0D, Carbon, compd. 7664-93-9D, Sulfuric acid, transition metal compds. 7697-37-2D, Nitric acid, transition metal compds. 7790-69-4, Lithium nitrate 10377-48-7, Lithium sulfate 12031-65-1, Lithium nickel oxide linio2 **12057-17-9**, Lithium manganese oxide limn2o4 12057-24-8, Lithium oxide, uses 12190-79-3, Cobalt lithium oxide colio2 15365-14-7, Iron lithium phosphate felipo4 135573-53-4, Cobalt lithium nickel oxide Co0-1LiNi0-1O2 182442-95-1, Cobalt lithium manganese nickel oxide
(carbon compd.-adsorbed cathode active material for lithium **battery**)
IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer
(carbon compd.-adsorbed cathode active material for lithium **battery**)
IT 9002-84-0, Ptfe **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; carbon compd.-adsorbed cathode active material for lithium **battery**)

L49 ANSWER 8 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 140:202489 HCA Full-text
TI Secondary nonaqueous **battery** and **separator** for the **battery**
IN Nishikawa, Satoshi; Honmoto, Hiroyuki; Daido, Takahiro
PA Teijin Limited, Japan
SO PCT Int. Appl., 55 pp.

CODEN: PIXXD2
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004019433	A1	20040304	WO 2003-JP10585	200308 21 <--
	W: AU, CA, CN, JP, KR, US RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR				
	CA 2496513	A1	20040304	CA 2003-2496513	200308 21 <--
	AU 2003257653	A1	20040311	AU 2003-257653	200308 21 <--
	EP 1538686	A1	20050608	EP 2003-792777	200308 21 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
	CN 1679181	A	20051005	CN 2003-819935	200308 21 <--
	CN 101005129	A	20070725	CN 2007-10084703	200308 21 <--
	US 2005277026	A1	20051215	US 2005-524880	200502 18 <--

PRAI	JP 2002-241905	A	20020822	<--
	JP 2003-67841	A	20030313	<--
	CN 2003-819935	A3	20030821	<--
	WO 2003-JP10585	W	20030821	<--

AB The **battery** has an anode comprising a Li-intercalating active mass, a cathode comprising a Li contg. transition metal oxide active mass, a

nonaq. electrolyte, and a **separator** enclosing a mesh support and consisted of a porous film which comprises an org. polymer swelling in the electrolyte soln.; where the mesh support has an av. film thickness of 10-30 μm, METSUKE of 6-20 g/m2, a Gurley value of ≤ 10 s/100cc, a MacMillan no. (25°) of ≤ 10, and MacMillan no. + film thickness (μm) of ≤ 200; the **separator** has an av. film thickness of 10-35 μm, METSUKE of 10-25 g/m2, a Gurley value of ≤ 60 s/100cc or 60-100 s/100 cc; and a specific relational expression is induced between an effective active mass in the **battery** system and the **overcharge** prevention function characteristic value of the **separator** from an electrochem. point of view to make the **battery** characteristics compatible with safety.

IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)
(secondary lithium **batteries** using **separators** with controlled characteristics for improved safety at **overcharging**)

RN 12057-17-9 HCA

CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

IC ICM H01M002-16
ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery separator** characteristic **overcharging** safety

IT Nonwoven fabrics
Secondary **battery separators**
(secondary lithium **batteries** using **separators** with controlled characteristics for improved safety at **overcharging**)

IT Fluoropolymers, uses
Polyesters, uses
Polyolefins
(secondary lithium **batteries** using **separators** with controlled characteristics for improved safety at **overcharging**)

IT 96-49-1, Ethylene carbonate 623-53-0, Ethyl methyl carbonate 12031-65-1, Lithium nickel oxide (LiNiO2) **12057-17-9**, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium oxide (CoLiO2) 21324-40-3, Lithium hexafluorophosphate 24937-79-9, PVDF 25038-59-9, Poly(ethylene terephthalate), uses 25101-47-7,

Chlorotrifluoroethylene-hexafluoropropylene-vinylidene fluoride copolymer
(secondary lithium **batteries** using **separators** with controlled characteristics for improved safety at **overcharging**)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 9 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 140:18362 HCA Full-text
TI Nonaqueous electrolyte secondary **battery**
IN Kuwahara, Yoshihiro
PA Japan Storage Battery Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2003346768	A	20031205	JP 2002-156275 <--	20020529 <--

PRAI JP 2002-156275 20020529 <--

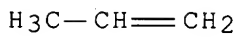
AB The nonaq. electrolyte secondary **battery** comprises an anode lead, a cathode lead, and a 3rd lead connecting a collector of a power generation unit comprising an anode sheet, a cathode sheet, and a **separator** inserted between these electrodes to a welding part of a **battery** case made of metal-laminated resin film: and the 3rd lead has a higher thermal cond. than those of the anode and cathode leads. Heat generated in the inside of the power generation unit in the case of **overcharging** is transmitted through the 3rd lead to melt the resin film at the welding part and thereby to release the gas evolved in the inside, resulting in prevention of the inner pressure increase and expansion and break of the case at the time of **overcharging**.

IT **9003-07-0**, Polypropylene
(**battery** casing made of laminate contg. metal, PET, and; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1

CMF C3 H6



IT **9002-88-4**, Polyethylene
(lead made of and laminate for **battery** casing contg.; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM H01M002-20
ICS H01M002-02; H01M002-06; H01M002-12; H01M010-40; H01M010-50
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery overcharging** casing pressure increase prevention; lead electrode unit gas release **battery**
IT Polyesters, uses
(**battery** casing made of laminate contg. metal, polyethylene, and; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
IT Secondary **batteries**
(nonaq. electrolyte; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
IT **9003-07-0**, Polypropylene
(**battery** casing made of laminate contg. metal, PET, and; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
IT 25038-59-9, Poly(ethylene terephthalate), uses
(**battery** casing made of laminate contg. metal, polyethylene, and; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)

IT 7429-90-5, Aluminum, uses
(lead made of and laminate for **battery** casing contg.; non-aq. electrolytic secondary **battery** with structure for gas release in **overcharging** for avoiding break of casing)
IT **9002-88-4**, Polyethylene
(lead made of and laminate for **battery** casing contg.; secondary **battery** with structure for gas release in **overcharging** for avoiding inner pressure increase)
IT 9002-86-2, Poly(vinyl chloride)
(lead made of,; non-aq. electrolytic secondary **battery** with structure for gas release in **overcharging** for avoiding break of casing)

L49 ANSWER 10 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 139:340034 HCA Full-text
TI Nonaqueous electrolyte secondary **battery** having excellent stability even at high capacity and output
IN Nakai, Kenji; Hironaka, Kensuke
PA Shin-Kobe Electric Machinery Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2003308843	A	20031031	JP 2002-114275	20020417 <--

PRAI JP 2002-114275 20020417 <--
AB The nonaq. secondary **battery** is manufd. by wetting electrode group, which is formed by arranging cathode obtained by coating a Li transition metal composite oxide-contg. cathode-active mass on both sides of the collector and anode obtained by coating anode-active mass contg. Li ion-occluding and releasing anode active material through a **separator**, with a nonaq. electrolyte prepd. by dissolving Li salt in a carbonic acid ester solvent and packing it into a **battery** case having an inner pressure-releasing mechanism, wherein a carbonate powder MCO3 (M=Zn, Cu, Pb, Ni), which dissolves in the nonaq. electrolyte at **over-charged** state, is added to the cathode active mass.
IT **39457-42-6**, Lithium manganese oxide
(cathode active material; nonaq. electrolyte secondary **battery** having excellent stability even at high capacity

and output)
RN 39457-42-6 HCA
CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M004-62
ICS H01M004-02; H01M004-58; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST nonaq electrolyte secondary **battery** carbonate cathode active mass
IT Carbonates, uses
(cathode-active mass contg.; nonaq. electrolyte secondary **battery** having excellent stability even at high capacity and output)
IT Secondary **batteries**
(nonaq. electrolyte secondary **battery** having excellent stability even at high capacity and output)
IT 7782-42-5, Graphite, uses
(anode active material; nonaq. electrolyte secondary **battery** having excellent stability even at high capacity and output)
IT **39457-42-6**, Lithium manganese oxide
(cathode active material; nonaq. electrolyte secondary **battery** having excellent stability even at high capacity and output)
IT 598-63-0, Lead carbonate 1184-64-1, Cupric carbonate 3333-67-3, Nickel carbonate 3486-35-9, Zinc carbonate
(cathode-active mass contg.; nonaq. electrolyte secondary **battery** having excellent stability even at high capacity and output)

L49 ANSWER 11 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 138:6451 HCA Full-text
TI Cylindrical secondary lithium **battery** equipped with notched **separator**
IN Koishikawa, Yoshimasa; Hironaka, Kensuke
PA Shin-Kobe Electric Machinery Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002352788	A	20021206	JP 2001-155437	200105 24 <--
PRAI	JP 2001-155437		20010524 <--		

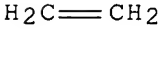
AB The title **battery** is equipped with a coiled stack contg. a Li Mn mixed oxide cathode and a carbon anode stored in a can having an internal pressure-releasing mechanism (PM), where a **separator** in the stack is thermally shrinkable in the width direction and has 20-50% notch at region protruded from the anode end to the PM side in the width direction. The **battery** has high capacity and safety during **overcharging**.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; thermally shrinkable notched **separator** in cylindrical secondary lithium **battery**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

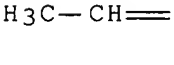
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16

ICS H01M002-12; H01M002-18; H01M004-58; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **separator** thermal shrinkage notch secondary lithium **battery** safety
IT Secondary **batteries**
(lithium; thermally shrinkable notched **separator** in cylindrical secondary lithium **battery**)
IT Fluoropolymers, uses
(**separator**; thermally shrinkable notched **separator** in cylindrical secondary lithium **battery**)
IT Safety
Secondary **battery separators**
(thermally shrinkable notched **separator** in cylindrical secondary lithium **battery**)
IT 9002-84-0, Polytetrafluoroethylene **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; thermally shrinkable notched **separator** in cylindrical secondary lithium **battery**)

L49 ANSWER 12 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 137:204003 HCA Full-text
TI Secondary **battery** with nonaqueous electrolyte containing aromatic compound
IN Kozuki, Kiyomi; Eda, Nobuo; Takahashi, Shozo; Bito, Yasuhiko; Kuranaka, Satoshi
PA Matsushita Electric Industrial Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002260627	A	20020913	JP 2001-59610	20010305 <--

PRAI JP 2001-59610 20010305 <--
AB The title **battery** is equipped with a nonaq. electrolyte contg. biphenyl, furan, thiophene, and/or its deriv. and a porous polyolefin **separator** having shrinkage 12-25% in the width direction of mech. elongation after adding tensile load 25 kg/cm2 in the longitudinal direction of mech. elongation at 120° under atm. for 15 min. Alternatively, the **battery** is equipped with a porous polyolefin

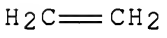
separator having the shrinkage 26-40% supported with an insulating part having heat-resistant strength higher than the **separator**. The **battery** has high safety during **overcharging** under high temp.

IT **9002-88-4**, Polyethylene
(HDPE; **battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

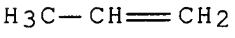


IT **9003-07-0**, Polypropylene
(**separator** support; **battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST arom compd nonaq electrolyte **battery** polyolefin **separator** safety
IT **Battery** electrolytes
Safety
Secondary **battery separators**
(**battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging**

safety)
IT Polyolefins
(**battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)
IT Secondary **batteries**
(lithium; **battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)
IT **9002-88-4**, Polyethylene
(HDPE; **battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)
IT 92-52-4, Biphenyl, uses 110-00-9, Furan 120-72-9, Indole, uses 17249-80-8, 3-Chlorothiophene
(**battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)
IT **9003-07-0**, Polypropylene
(**separator** support; **battery** with nonaq. electrolyte contg. arom. compd. and polyolefin **separator** for **overcharging** safety)

L49 ANSWER 13 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 137:157165 HCA Full-text
TI Secondary nonaqueous-electrolyte **battery** with thin **separator**
IN Bito, Yasuhiko; Kozuki, Kiyomi; Nitta, Yoshiaki; Eda, Nobuo; Takahashi, Shozo; Kuranaka, Satoshi
PA Matsushita Electric Industrial Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002231209	A	20020816	JP 2001-24691	200101 31

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PRAI JP 2001-24691 20010131 <--
AB The title **battery** is equipped with a **separator** contg. a polymeric porous membrane, which provides gas permeation resistance 50-700 s/100 mL after heating in air at 100-170° for 15-20 min. Also claimed is a **battery** equipped with a polymeric porous membrane

controlled gas permeation resistance after heating for secondary nonaq.-electrolyte **battery**)

IT Safety
Secondary **battery separators**
(**separator** contg. polymer membrane having controlled gas permeation resistance after heating for secondary nonaq.-electrolyte **battery**)

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** contg. polymer membrane having controlled gas permeation resistance after heating for secondary nonaq.-electrolyte **battery**)

L49 ANSWER 14 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 137:96236 HCA Full-text
TI Secondary nonaqueous-electrolyte lithium **battery** and manufacture of **separator** for it
IN Bito, Yasuhiko; Kozuki, Kiyomi; Kuranaka, Satoshi; Eda, Nobuo
PA Matsushita Electric Industrial Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002198025	A	20020712	JP 2000-397371 <--	20001227

PRAI JP 2000-397371 20001227 <--

AB The **battery** includes a **separator** comprising an elec. insulating porous substrate on which Sn compds. and/or Pd compds. are supported. The **separator** is manufd. by immersing an elec. insulating porous substrate in a soln. contg. Sn compds. and/or Pd compds. Since the Sn compds. and/or Pd compds. are selectively reduced in early stage of **overcharging**, internal short circuits are accelerated and temp. increase of **overcharged battery** can be suppressed.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(Sn compd. and/or Pd compd. supported on elec. insulating porous substrate as **separator** for nonaq.-electrolyte Li **battery**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

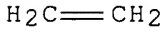
separator providing 90% pore size (D90) 0.05-0.5 μm in pore size distribution after heating in air (1) at 100-120° for 15-20 min under 30-60 kg/cm2 tensile load in the longitudinal direction or (2) at 120-140° for 15-20 min under fixation in the width direction. The **battery** may use a **separator** having thickness 5-20 μm. The **battery** is suppressed from temp. increase under **overcharging** for high safety.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** contg. polymer membrane having controlled gas permeation resistance after heating for secondary nonaq.-electrolyte **battery**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

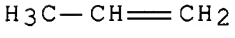
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



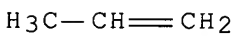
IC ICM H01M002-16
ICS H01M002-16; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **separator** polymer membrane nonaq **battery** **overcharging** safety
IT Polyamide fibers, uses
(aramid; **separator** contg. polymer membrane having controlled gas permeation resistance after heating for secondary nonaq.-electrolyte **battery**)
IT Secondary **batteries**
(lithium; **separator** contg. polymer membrane having

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M004-58; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST elec insulating porous substrate tin compd **separator** lithium **battery**; palladium compd elec insulating porous substrate **separator** lithium **battery**; **overcharge** temp increase suppression nonaq electrolyte lithium **battery separator**
IT Secondary **battery separators**
(Sn compd. and/or Pd compd. supported on elec. insulating porous substrate as **separator** for nonaq.-electrolyte Li **battery**)
IT Polyamides, uses
(arom.; Sn compd. and/or Pd compd. supported on elec. insulating porous substrate as **separator** for nonaq.-electrolyte Li **battery**)
IT 1314-08-5, Palladium oxide (PdO) 3375-31-3 7488-55-3, Tin sulfate (SnSO4) 7646-78-8, Tin chloride (SnCl4), uses 7647-10-1, Palladium chloride (PdCl2) 7772-99-8, Tin chloride (SnCl2), uses **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene 12026-24-3, Tin hydroxide (Sn(OH)2) 12054-72-7, Tin hydroxide (Sn(OH)4) 12135-22-7, Palladium hydroxide (Pd(OH)2) 13566-03-5, Palladium sulfate (PdSO4) 13826-70-5, Tin nitrate (Sn(NO3)4) 13912-55-5, Tin carbonate (SnCO3) 16834-09-6 18725-92-3 19307-28-9, Tin sulfate (Sn(SO4)2) 22755-27-7, Tin nitrate (Sn(NO3)2) 91864-03-8

(Sn compd. and/or Pd compd. supported on elec. insulating porous substrate as **separator** for nonaq.-electrolyte Li **battery**)

L49 ANSWER 15 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 136:105190 HCA Full-text
TI Safe nonaqueous electrolyte secondary **batteries**
IN Oba, Kazuhiro
PA Sony Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002025526	A	20020125	JP 2000-206224	20000707

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PRAI JP 2000-206224 20000707 <--

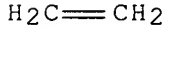
AB The **batteries** comprise a rolled laminate of a pair of electrodes and in-between **separators** consisting of ≥2 **separators** having different thermomech. properties.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators**; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

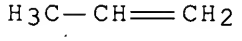
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST safe nonaq secondary **battery** double **separator**;
self shut down safe lithium secondary **battery**
IT Safety
Secondary **battery separators**
(highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)
IT Secondary **batteries**
(lithium; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)
IT Secondary **batteries**
(nonaq. electrolyte; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)
IT Nonwoven fabrics
Textiles
(**separators**; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)
IT Glass fibers, uses
Polyamide fibers, uses
Polyimide fibers
(**separators**; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
9004-34-6, Cellulose, uses
(**separators**; highly safe nonaq. electrolyte secondary **batteries** with self shut-down **separators** on **overcharging**)

L49 ANSWER 16 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 133:225560 HCA Full-text
TI Sealed alkaline secondary **battery separators** made of partially hydrophilized microporous polyolefin membranes

IN Tsujioka, Norio; Kondo, Takahiko
PA Asahi Chemical Industry Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000248095	A	20000912	JP 1999-50427	19990226

<--

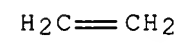
PRAI JP 1999-50427 19990226 <--

AB The microporous membranes have thickness 20-120 μm, MD tensile breaking strength ≥100 kg/cm2, porosity ≥30%, and av. pore diam. 0.01-1 μm. The ratio of hydrophilic pores to hydrophobic pores is 70:30-95:5 and any hydrophilic pore on the membrane surface is accompanied by a hydrophobic pore within 5 mm distance, and vice versa. Increase of internal pressure in the **batteries**, under **overcharging**, is prevented.

IT **9002-88-4**, Polyethylene
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



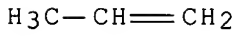
IT **9003-07-0**, Polypropylene
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1

10/809,875

CMF C3 H6



IC ICM C08J009-00
ICS H01M002-16; H01M010-24
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST sealed alk secondary **battery** polyolefin **separator** ; microporous partially hydrophilized polyolefin **battery separator**
IT Membranes, nonbiological
(microporous; partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
IT Secondary **battery separators**
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
IT Polyolefins
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
IT 621-82-9D, Cinnamic acid, poly(vinyl alc.) modified with
9002-89-5D, Poly(vinyl alcohol), cinnamic acid-modified
25038-32-8D, Isoprene-styrene copolymer, sulfonated
(hydrophilized with; partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
IT **9002-88-4**, Polyethylene
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)
IT **9003-07-0**, Polypropylene
(partially hydrophilized microporous polyolefin membranes for sealed alk. secondary **batteries**)

L49 ANSWER 17 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 130:156031 HCA Full-text
TI Characterization of microporous **separators** for lithium-ion **batteries**
AU Venugopal, Ganesh; Moore, John; Howard, Jason; Pendalwar, Shekhar
CS Motorola Energy Systems Group, Lawrenceville, GA, 30043, USA
SO Journal of Power Sources (**1999**), 77(1), 34-41
CODEN: JPSODZ; ISSN: 0378-7753
PB Elsevier Science S.A.
DT Journal
LA English

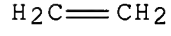
AB Several properties including porosity, pore-size distribution, thickness value, electrochem. stability and mech. properties have to be optimized before a membrane can qualify as a **separator** for a lithium-ion **battery**. In this paper we present results of characterization studies carried out on some com. available lithium-ion **battery separators**. The relevance of these results to **battery** performance and safety are also discussed. Porosity values were measured using a simple liq. absorption test and gas permeabilities were measured using a novel pressure drop technique that is similar in principle to the Gurley test. For **separators** from one particular manufacturer, the trend obsd. in the pressure drop times was found to be in agreement with the Gurley nos. reported by the **separator** manufacturer. Shutdown characteristics of the **separators** were studied by measuring the impedance of **batteries** contg. the **separators** as a function of temp. **Overcharge** tests were also performed to confirm that **separator** shutdown is indeed a useful mechanism for preventing thermal runaway situations. Polyethylene-contg. **separators**, in particular trilayer laminates of polypropylene, polyethylene, and polypropylene, appear to have the most attractive properties for preventing thermal runaway in lithium-ion cells.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; characterization of microporous **separators** for lithium-ion **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

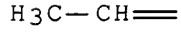
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **separator** microporous characterization lithium ion **battery**; safety lithium ion **battery** microporous **separator**
IT Permeability
Porosity
Secondary **battery separators**
(characterization of microporous **separators** for lithium-ion **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator**; characterization of microporous **separators** for lithium-ion **batteries**)
RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 18 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 129:345401 HCA Full-text
TI Secondary nonaqueous electrolyte **batteries**
IN Otani, Akira; Uetani, Keisuke; Yamamoto, Kazunari
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

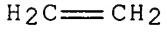
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10289704	A	19981027	JP 1997-95906	19970414 <--

PRAI JP 1997-95906 19970414 <--
AB The **batteries** have a microporous **separators** between a cathode and an anode, where the **separator** contains a 1st component, having a melt index ≥0.35 and a m.p. below the temp. initiating a reaction between metal dendrites deposited on the anode and the **battery** electrolyte, and a 2nd component having a m.p. higher than the reaction initiating temp., with the 1st component at least facing the anode to melt and coat the dendrites during **overcharging**.
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(m.p. and melt index requirements of polymer components in composite **separators** for preventing dendrite reactions in secondary **batteries**)
RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

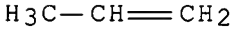
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary **battery separator** self shutdown composite; melt index secondary **battery separator**
IT Secondary **battery separators**
(m.p. and melt index requirements of polymer components in composite **separators** for preventing dendrite reactions in secondary **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(m.p. and melt index requirements of polymer components in composite **separators** for preventing dendrite reactions in secondary **batteries**)

L49 ANSWER 19 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 127:20898 HCA Full-text
TI Nonaqueous electrolyte secondary **batteries**
IN Chikayama, Koichi; Ikehata, Toshihiko; Oo, Fumio
PA Matsushita Electric Industrial Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent

LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09092240	A	19970404	JP 1995-242891	199509 21 <--
PRAI	JP 1995-242891		19950921 <--		

AB The secondary **batteries** consist of a pos. electrode from composite oxide of Li and transition metals, a neg. electrode from spinel type Li Ti oxide or W oxide, a **separator**, and non-aq. electrolyte, and are sealed with a plate of a stainless steel contg. 1-3% Mo and 16.5-19.5% Cr with direct or indirect contact with the neg. electrode for prevention of deterioration due to ling-term **over discharge**.

IT **39457-42-6**, Lithium manganese oxide
(pos. active material; stainless steel for nonaq. electrolyte lithium **batteries** for prevention of deterioration due to long-term **over discharge**)

RN 39457-42-6 HCA
CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IC ICM H01M002-04
ICS C22C038-00; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 55
ST stainless steel nonaq electrolyte lithium **battery**
IT Secondary **batteries**
(stainless steel for nonaq. electrolyte lithium **batteries** for prevention of deterioration due to long-term **over discharge**)
IT 39302-37-9, Lithium titanium oxide
(neg. active material; stainless steel for nonaq. electrolyte lithium **batteries** for prevention of deterioration due to long-term **over discharge**)
IT **39457-42-6**, Lithium manganese oxide
(pos. active material; stainless steel for nonaq. electrolyte lithium **batteries** for prevention of deterioration due to long-term **over discharge**)

IT 51968-05-9 189884-78-4
(stainless steel for nonaq. electrolyte lithium **batteries** for prevention of deterioration due to long-term **over discharge**)

L49 ANSWER 20 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 126:240724 HCA Full-text
TI Polymerizable aromatic additives for **overcharge** protection in secondary nonaqueous lithium **batteries**
IN Mao, Huanyu
PA Moli Energy (1990) Limited, Can.
SO Eur. Pat. Appl., 15 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 759641	A1	19970226	EP 1996-305460	19960725
				<--	
	EP 759641	B1	20030709		
	R: DE, FR, GB				
	CA 2156800	A1	19970224	CA 1995-2156800	19950823
				<--	
	CA 2156800	C	20030429		
	US 5879834	A	19990309	US 1996-681171	19960722
				<--	
	JP 09106835	A	19970422	JP 1996-213517	19960813
				<--	
	JP 3061756	B2	20000710		
PRAI	CA 1995-2156800	A	19950823 <--		

AB The title **batteries** can be protected against **overcharge** abuse by incorporating small amts. of suitable arom. additives into the electrolyte. The additives are electrochem. polymd. at abnormally high voltages, thereby increasing the internal resistance of the **battery** and thus protecting it. The additives biphenyl, 3-chlorothiophene, and furan are esp. suitable for certain Li ion **batteries**. The additives, monomers need not and may preferably not

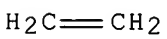
polymerize during over-temp. abuse, and they are used at .ltorsim.5 vol.% of the mixt. of liq. electrolyte and monomer.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** from microporous polyolefin film for safety of nonaq. lithium **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

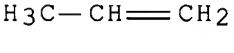
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M010-40
ICS H01M006-16; H01M010-42

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium nonaq **battery** polymerizable arom additive; biphenyl additive lithium nonaq **battery** safety; chlorothiophene additive lithium nonaq **battery** safety; furan additive lithium nonaq **battery** safety

IT Secondary **batteries**
(lithium; polymerizable arom. additives for **overcharge** protection in)

IT Secondary **battery separators**
(microporous polyolefin film for safety of nonaq. lithium **batteries**)

IT Safety
(polymerizable arom. additives for **overcharge** protection in secondary nonaq. lithium **batteries**)

IT 92-52-4, Biphenyl, uses 110-00-9, Furan 17249-80-8, 3-Chlorothiophene
(polymerizable additives for **overcharge** protection in secondary nonaq. lithium **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** from microporous polyolefin film for safety of nonaq. lithium **batteries**)

L49 ANSWER 21 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 121:13934 HCA Full-text
TI Composite **separators** for alkaline **batteries**
IN Nishimura, Yoshifumi
PA Asahi Chemical Ind, Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 06076807	A	19940318	JP 1993-169152	19930708

<--

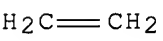
PRAI JP 1992-183909 A1 19920710 <--

AB The **separators** are laminates of nonwoven fabrics and porous membranes, which, when wet, have penetrating hydrophilic and hydrophobic areas sepd. from each other by nonporous areas. These **separators** facilitates absorption of O generated during **overcharging** of **batteries** and prevents dendrite growth on anodes.

IT **9002-88-4P**, Polyethylene
(composite **separators** contg. nonwoven fabrics and porous films of, structure and manuf. of, for alk. **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

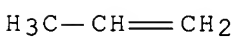
CRN 74-85-1
CMF C2 H4



IT **9003-07-0P**, Polypropylene
(fibers, **separators** contg. porous polyethylene films and nonwoven fabrics of, structure and manuf. of, for alk. **batteries**)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery separator** composite; nickel zinc **battery** composite **separator**
IT Polypropene fibers, miscellaneous
(nonwoven fabrics, **separators** contg. porous polyethylene films and, structure and manuf. of, for alk. **batteries**)
IT **Batteries**, secondary
(**separators**, porous polyethylene-nonwoven fabric laminate, structure and manuf. of)
IT **9002-88-4P**, Polyethylene
(composite **separators** contg. nonwoven fabrics and porous films of, structure and manuf. of, for alk. **batteries**)
IT **9003-07-0P**, Polypropylene
(fibers, **separators** contg. porous polyethylene films and nonwoven fabrics of, structure and manuf. of, for alk. **batteries**)
IT 97-64-3, Ethyl lactate 117-81-7, DOP 7631-86-9, Silica, uses 9004-35-7, Acetyl cellulose
(in manuf. of composite **separators** having hydrophilic and hydrophobic areas for alk. **batteries**)
IT 9004-34-6P, Cellulose, miscellaneous
(nonwoven fabrics, **separators** contg. porous polyethylene films and, structure and manuf. of, for alk. **batteries**)

L49 ANSWER 22 OF 26 HCA COPYRIGHT 2007 ACS on STN

AN 114:232036 HCA Full-text
TI Secondary nonaqueous **batteries**
IN Mochizuki, Yuji; Ikeda, Katsuharu; Tsuchiya, Kenji; Miyabayashi, Mitsutaka; Yui, Hiroshi
PA Toshiba Battery Co., Ltd., Japan; Mitsubishi Petrochemical Co., Ltd.
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 02215061	A	19900828	JP 1989-35042	19890216 <--

PRAI JP 1989-35042 19890216 <--

AB The **batteries** have an electrolyte-laden **separator** and an active species which migrates between the cathode and the anode during the charging and discharging of the **batteries** . The anode is Li or a Li alloy and the cathode is prepd. by melting V2O5 and <30 mol% (of V2O5) P2O5, quenching the melt, and mixing the amorphous powder with <10 mol% (of V2O5) spinel-type LiMn2O4. These **batteries** have long cycle life and high tolerance for **overcharging**.

IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)
39457-42-6, Lithium manganese oxide
(cathodes contg., amorphous phosphorus oxide-vanadium oxide, for lithium **batteries**)

RN 12057-17-9 HCA
CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 39457-42-6 HCA
CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5

Li | x | 7439-93-2

IC ICM H01M010-40
ICS H01M004-02; H01M004-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium metal oxide **battery**; vanadium phosphorus oxide **battery** cathode; manganese lithium oxide **battery** cathode
IT Cathodes
(**battery**, phosphorus oxide-vanadium oxide, amorphous, contg. lithium manganese oxide)
IT **12057-17-9**, Lithium manganese oxide (LiMn2O4)
39457-42-6, Lithium manganese oxide
(cathodes contg., amorphous phosphorus oxide-vanadium oxide, for lithium **batteries**)
IT 1314-62-1, Vanadium pentoxide, uses and miscellaneous
(cathodes from amorphous phosphorus oxide and, contg. lithium manganese oxide, for lithium **batteries**)
IT 1314-56-3, Phosphorus pentoxide, uses and miscellaneous
(cathodes from amorphous vanadium oxide and, contg. lithium manganese oxide, for lithium **batteries**)
IT 133869-12-2, Vanadium oxide phosphate (V1.9O4.6(PO4)0.1)
(cathodes from amorphous, contg. lithium manganese oxide, for lithium **batteries**)

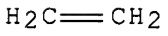
L49 ANSWER 23 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 109:173540 HCA Full-text
TI Inorganic electrolyte lithium/sulfur dioxide rechargeable system. Development of a prototype hermetic C cell and evaluation of its performance and safety characteristics
AU Dey, A. N.; Kuo, H. C.; Piliero, P.; Kallianidis, M.
CS Duracell Res. Cent., Duracell Inc., Needham, MA, 02194, USA
SO Journal of the Electrochemical Society (**1988**), 135(9), 2115-20
CODEN: JESOAN; ISSN: 0013-4651
DT Journal
LA English
AB A prototype sealed C-size Li/SO2 **battery** with LiAlCl4-6 SO2 electrolyte and a carbon black cathode plate has an open-circuit voltage of 3.2 V, a nominal capacity of 1.8 A-h, and an energy d. of 135 W-h/kg. The **battery** has a cycle life of 50 cycles at 1 A (3.4 mA/cm2) discharge to a 2.0 V cut-off voltage, with 0.1 A (0.34 mA/cm2) charge. The **battery** can sustain periods of extended **overcharge** but **discharge** below 1.0 V is hazardous. The prototype **battery** design, cathode plate and **separator** material evaluation, performance, and safety parameters are described.
IT **9002-88-4**, Polyethylene **9003-07-0**, Celgard 3401

(**battery separators**, in lithium-sulfur dioxide **batteries**, pressure increase and safety in relation to)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

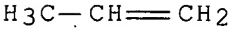
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



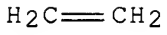
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72
ST lithium sulfur dioxide **battery** safety; electrolyte lithium chloroaluminate sulfur dioxide
IT Carbon black, uses and miscellaneous
(cathode plates, evaluation of, for lithium-sulfur dioxide rechargeable **batteries**)
IT Electric conductivity and conduction
(of lithium chloroaluminate-sulfur dioxide electrolyte, in lithium rechargeable **batteries**)
IT **Batteries**, secondary
(sealed, lithium-sulfur dioxide, with lithium chloroaluminate-sulfur dioxide electrolyte, performance and safety of)
IT **Batteries**, secondary
(**separators**, Celgard and polyethylene, in lithium-sulfur dioxide **batteries**, pressure increase and safety in relation to)

IT **9002-88-4**, Polyethylene **9003-07-0**, Celgard 3401
(**battery separators**, in lithium-sulfur dioxide **batteries**, pressure increase and safety in relation to)
IT 9002-84-0, PTFE
(cathode plates contg. carbon black and, evaluation of, for lithium-sulfur dioxide rechargeable **batteries**)
IT 7446-09-5, Sulfur dioxide, uses and miscellaneous
(electrolytes contg. lithium chloroaluminate and, lithium **battery** contg., performance and safety of)
IT 14024-11-4, Lithium chloroaluminate (LiAlCl4)
(electrolytes contg., lithium-sulfur dioxide **batteries** contg., performance and safety of)

L49 ANSWER 24 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 108:207646 HCA Full-text
TI Inorganic electrolyte lithium/sulfur dioxide rechargeable system: development of a prototype hermetic C cell and evaluation of the performance and safety characteristics
AU Dey, A. N.; Kuo, H. C.; Keister, P.; Kallianidis, M.
CS Duracell Res. Cent., Duracell Inc., Needham, MA, 02194, USA
SO Proceedings - Electrochemical Society (**1988**), 88-6(Proc. Symp. Primary Second. Ambient Temp. Lithium Batteries, 1987), 343-62
CODEN: PESODO; ISSN: 0161-6374
DT Journal
LA English
AB A prototype C-size Li-SO2 **battery** contg. LiAlCl4.6SO2 electrolyte and a graphitized carbon black cathode had an open-circuit voltage 3.2 V, a nominal capacity 1.8 A-h, energy densities of 3.6 W-h/in.3 and 135 W-h/kg, and a cycle life of 50 cycles at 1 A (3.4 mA/cm2) discharge to a 2.0 V cutoff with 0.1 A (0.34 mA/cm2) charge. The cell sustained periods of extended **overcharge**. A discharge below 1.0 V is hazardous. The chem. of the system, cell design, performance, and safety characteristics are described.
IT **9002-88-4**, Polyethylene **9003-07-0**, Celgard 3401
(**battery separators**, degrdn. of, in lithium tetrachloroaluminate-sulfur dioxide electrolyte contg. chlorine and aluminum chloride)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

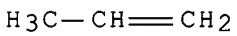
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium sulfur dioxide **battery** safety
IT Graphitized carbon black
(cathodes, in lithium secondary **battery** contg. lithium tetrachloroaluminate-sulfur dioxide electrolyte)
IT **Batteries**, secondary
(lithium-sulfur dioxide, with lithium tetrachloroaluminate electrolyte, performance and safety of)
IT Safety
(of lithium-sulfur dioxide secondary **battery** with lithium tetrachloroaluminate electrolyte)
IT **9002-88-4**, Polyethylene **9003-07-0**, Celgard 3401
(**battery separators**, degrdn. of, in lithium tetrachloroaluminate-sulfur dioxide electrolyte contg. chlorine and aluminum chloride)
IT 7446-09-5, Sulfur dioxide, uses and miscellaneous
(electrolyte, contg. lithium tetrachloroaluminate, in lithium secondary **batteries**)
IT 14024-11-4, Lithium tetrachloroaluminate
(electrolyte, contg. sulfur dioxide, in lithium secondary **batteries**)

L49 ANSWER 25 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 96:107211 HCA Full-text
TI Storage **battery separator** compositions
IN Hasegawa, Takao; Takahashi, Wataru
PA Nippon Mukiseni Kogyo K. K., Japan
SO Brit. UK Pat. Appl., 6 pp.
CODEN: BAXXDU

DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	GB 2070033	A	19810903	GB 1981-672	19810109
	GB 2070033	B	19830921		
PRAI	JP 1980-2608	A	19800116		

AB Storage **battery separators** having decreased brittleness, improved oxidn. resistance, and a tendency to reduce the degree of **overcharging** of **batteries** contg. them were manufd. from a compn. comprising novolak or resol. phenolic resin 5-50, polyolefin 10-60, and an inorg. powder, e.g. SiO2, 35-85%. The compn. may also include a wetting agent, e.g. anionic Na dialkyl sulfosuccinate. The components are mixed together, preferably with a stabilizer or antioxidant for the polyolefin, in an org. liq., e.g. mineral oil, and the mixt. is extrusion molded into a sheet. The sheet is treated with a solvent to remove the org. liq., dried, and cut into a predetd. size to obtain the microporous **separator**.

IT **9002-88-4 9003-07-0**
(storage **battery separators** contg., manuf. of)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

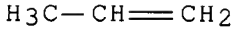
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC C08L023-02; C08L061-06
ICA H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST storage **battery separator** phenolic resin; polyolefin storage **battery separator**; silica storage **battery separator**; sodium alkyl sulfosuccinate **battery separator**
IT Carbon black, uses and miscellaneous
Kaolin, uses and miscellaneous
Kieselguhr
Silicates, uses and miscellaneous
(phenolic resin compns. contg., storage **battery separators** of, manuf. of)
IT Alkenes, polymers
Phenolic resins, uses and miscellaneous
(storage **battery separators** contg., manuf. of)
IT Glass, oxide
(powd., phenolic resin compns. contg., storage **battery separators** of, manuf. of)
IT **Batteries**, secondary
(**separators**, manuf. of, phenolic resin-contg. compns. for)
IT 20526-58-3D, dialkyl derivs. 25322-68-3D, alkyl ethers
(phenolic resin compns. contg., for **battery separators**)
IT 471-34-1, uses and miscellaneous 1344-28-1, uses and miscellaneous 7631-86-9, uses and miscellaneous 14807-96-6, uses and miscellaneous
(phenolic resin compns. contg., storage **battery separators** of, manuf. of)
IT **9002-88-4 9003-07-0** 9003-29-6
(storage **battery separators** contg., manuf. of)

L49 ANSWER 26 OF 26 HCA COPYRIGHT 2007 ACS on STN
AN 62:42007 HCA Full-text
OREF 62:7390h,7391a
TI Gas-tight storage **battery** with an alkaline electrolyte
IN Aulin, Sven O.; Jonsson, Erik
PA Svenska Akkumulator Aktiebolag Jungner
SO 5 pp.

DT Patent
LA Unavailable
FAN.CNT 1

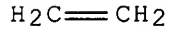
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DE 1175765		19640813	DE 1963-S84286	196303 21
			<--	
PRAI SE		19620405 <--		

AB Gas-tight storage **batteries** with large storage capabilities, which can withstand severe **overcharging**, can be made by using a **separator** which is evenly wetted by adsorption of the electrolyte. The largest part of the electrolyte is stored in the capillaries of the electrodes. The max. quantity of electrolyte contained in the **separator** corresponds to 35% of its pore vol. The **separator** can be made from loosely felted fibers of polyethylene, polypropylene, polyamide, etc.

IT **9002-88-4**, Ethylene polymers
(as storage **battery separator**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

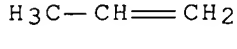
CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, Propene polymers
(**separator** for alk. gas-tight storage **batteries**
)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC H01M
CC 15 (Electrochemistry)
IT Storage **batteries**
(amide polymer **separators** for alk.)
IT Storage **batteries**
(gas-tight alk., **separators** for)
IT Amides
(poly-, **separators** for alk. gas-tight storage **batteries**)
IT Amides
(poly-, **separators** for alk. storage **batteries**)
IT **9002-88-4**, Ethylene polymers
(as storage **battery separator**)
IT **9003-07-0**, Propene polymers
(**separator** for alk. gas-tight storage **batteries**)
IT 13463-39-3, Nickel carbonyl
(storage **battery** electrodes contg. sintered)

=> D L50 1-33 BIB ABS HITSTR HITIND

L50 ANSWER 1 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 142:25938 HCA Full-text
TI **Battery separators** containing reactive functional groups
IN Pekala, Richard W.
PA USA
SO U.S. Pat. Appl. Publ., 7 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004248012	A1	20041209	US 2004-857037	200405 28
			<--	
US 7267909	B2	20070911		
WO 2005001956	A2	20050106	WO 2004-US17065	200405

<--

WO 2005001956 A3 20060803
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

JP 2007525789 T 20070906 JP 2006-515024
200405
28

<--

CN 101044643 A 20070926 CN 2004-80015196
200405
28

<--

PRAI US 2003-476446P P 20030606 <--
WO 2004-US17065 W 20040528

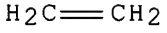
AB A **battery separator** having a thermal **shutdown** mechanism and exhibiting excellent mech. properties and low elec. resistance includes a water-scavenging and/or acid-scavenging material having reactive functional groups that chem. react with water or acid in the **battery** to remove the water or acid and thereby improve **battery** performance. The **battery separator** preferably includes a first polyolefin providing mech. integrity and a second polyolefin including the water-scavenging or acid-scavenging reactive functional groups. The **battery separator** is preferably a microporous film including a polymer matrix throughout which the water-scavenging or acid-scavenging material is dispersed.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**battery separators** contg. reactive functional groups)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

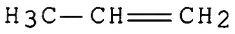
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



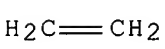
IC ICM H01M002-16
INCL 429250000; 429254000; 429144000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** reactive functional group
IT Primary **battery separators**
Secondary **battery separators**
(**battery separators** contg. reactive functional groups)
IT Polyolefins
(**battery separators** contg. reactive functional groups)
IT Primary **batteries**
Secondary **batteries**
(lithium; **battery separators** contg. reactive functional groups)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene 25068-26-2, Poly-4-methyl-1-pentene
(**battery separators** contg. reactive functional groups)
IT 4485-12-5, Lithium stearate 89421-57-8, Irganox b215
(**battery separators** contg. reactive functional groups)

L50 ANSWER 2 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 138:207704 HCA Full-text
TI Fabrication and performance characteristics of plastic Li-ion **batteries** with bonded untreated microporous polyolefin **separators**

AU Gozdz, Antoni S.; Plitz, Irene; DuPasquier, Aurelien; Zheng, Tao
CS Telcordia Technologies, Red Bank, NJ, 07701, USA
SO Proceedings - Electrochemical Society (**2001**), 2000-21(Rechargeable Lithium Batteries), 336-351
CODEN: PESODO; ISSN: 0161-6374
PB Electrochemical Society
DT Journal
LA English
AB A new, simplified and reliable process for the fabrication of flat, rechargeable Li-ion **batteries** is reported. Densified, propylene carbonate-plasticized electrodes were permanently bonded to different untreated microporous polyolefin **separators**. The process was demonstrated using various poly(vinylidene difluoride) polymers or copolymers as electrode binders and several electroactive materials. **Batteries** fabricated with the new technique exhibit excellent cycle life (<20% capacity loss after 1000 cycles), high rate capability (75-80% capacity use at a 3C rate at 3.2 mA-h/cm2), good rate capability at low temps. (50% capacity at -20° at a C/2 rate), very low internal impedance (20 mΩ/A-h at 1 kHz), high sp. energy (>180 W-h/kg), as well as excellent stability during storage and cycling at elevated temps. The desirable thermal-**shutdown** behavior of the bonded **separators** at .apprx.135° was not adversely affected by the process.
IT **9002-88-4**, Celgard K878 **9003-07-0**, Celgard 2300
(**separator**; fabrication and performance of plastic lithium-ion **batteries** with bonded untreated microporous polyolefin **separators**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST propylene carbonate plasticized electrode bonding microporous polyolefin **separator battery**
IT Adhesion, physical
Battery electrodes
Secondary **batteries**
Secondary **battery separators**
(fabrication and performance of plastic lithium-ion **batteries** with bonded untreated microporous polyolefin **separators**)
IT Polyolefins
(fabrication and performance of plastic lithium-ion **batteries** with bonded untreated microporous polyolefin **separators**)
IT 108-32-7, Propylene carbonate
(plasticizer; fabrication and performance of plastic lithium-ion **batteries** with bonded untreated microporous polyolefin **separators**)
IT **9002-88-4**, Celgard K878 **9002-88-4**
9003-07-0, Celgard 2300 500354-80-3, Teklon C 2
500354-83-6, Teklon C 7
(**separator**; fabrication and performance of plastic lithium-ion **batteries** with bonded untreated microporous polyolefin **separators**)
RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 3 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 137:372570 HCA Full-text
TI Microporous polyolefin films
IN Tsujioka, Norio; Kondo, Takahiko; Saito, Yoko
PA Asahi Kasei Kabushiki Kaisha, Japan
SO PCT Int. Appl., 19 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002092677	A1	20021121	WO 2002-JP4743	

PI WO 2002092677 A1 20021121 WO 2002-JP4743

200205
16
<--

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2002308991 A1 20021125 AU 2002-308991
200205
16
<--

CN 1509307 A 20040630 CN 2002-810075
200205
16
<--

TW 543224 B 20030721 TW 2002-91110413
200205
17
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PRAI JP 2001-147935 A 20010517 <--
WO 2002-JP4743 W 20020516 <--

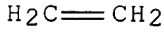
AB The films, having high strength at high temps. and low **shutdown** temp., are made of a compn. contg. essential ingredients of (A) polyethylene having a viscosity-av. mol. wt. of 50,000-1,500,000 and (B) polypropylene having a viscosity-av. mol. wt. of 100,000-1,500,000 in such proportions that A + B is ≥80% based on the whole compn., A/(A + B) is 51-90%, and B/(A + B) is 10-49%. The films have a **shutdown** temp. of ≤140° and show a continuous phase in which polyethylene and polypropylene are intertwined with each other. The films are useful for **battery separators**.

IT **9002-88-4**, Polyethylene
(HDPE; microporous polyolefin films for **battery separators**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

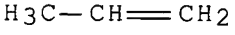
CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, Polypropylene
(microporous polyolefin films for **battery separators**)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-26
ICS H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST polyethylene polypropylene blend microporous film; microporous polyolefin film **battery separator**
IT Porous materials
(films; microporous polyolefin films for **battery separators**)
IT Secondary **battery separators**
(microporous polyolefin films for **battery separators**)
IT Polyolefins
(microporous polyolefin films for **battery separators**)
IT Polymer blends
(polyethylene-polypropylene; microporous polyolefin films for **battery separators**)
IT Films
(porous; microporous polyolefin films for **battery separators**)
IT **9002-88-4**, Polyethylene
(HDPE; microporous polyolefin films for **battery separators**)
IT **9003-07-0**, Polypropylene
(microporous polyolefin films for **battery**

separators)
RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 4 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 137:327467 HCA Full-text
TI Polyolefine laminate microporous films, and **separators** made of them for nonaqueous electrolyte **batteries**
IN Adachi, Yoshiyuki; Nishimura, Yoshifumi
PA Asahi Kasei Corporation, Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002321323	A	20021105	JP 2001-126337	200104 24

<--

PRAI JP 2001-126337 20010424 <--

AB The **battery separators** are made of laminates of polyethylene microporous films and microporous films contg. polyethylene and polypropylene. The **separators**, suitable for secondary Li **batteries**, show both satisfactory strength and safety **shutdown** performance.

IT **9002-88-4**, HDPE **9003-07-0**, Polypropylene
(microporous film; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

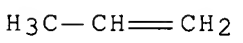
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM B32B027-32
ICS B32B005-32; H01M002-16; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST polyolefin microporous film laminate; lithium **battery** safety **separator** polyolefin laminate
IT Safety
(**batteries**; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
IT Linear low density polyethylenes
(microporous film; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
IT Secondary **battery separators**
(polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
IT Laminated plastics, uses
(polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
IT Alkenes, uses
(α-, polymers with ethylene, microporous film; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)
IT 74-85-1D, Ethene, polymers with α-olefins
(LLDPE, microporous film; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**
)
IT **9002-88-4**, HDPE **9003-07-0**, Polypropylene
(microporous film; polyolefin laminate microporous films for **separators** for nonaq. electrolyte **batteries**)

L50 ANSWER 5 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 136:372263 HCA Full-text
TI Secondary nonaqueous electrolyte **batteries** using microporous **separators** having **shutdown** function
IN Akashi, Hiroyuki
PA Sony Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 18 pp.
CODEN: JKXXAF

DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002151039	A	20020524	JP 2000-344495	20001110 <--

PRAI JP 2000-344495 20001110 <--

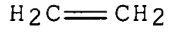
AB The **batteries** use anodes whose capacity is represented as the sum of capacity components obtained upon absorption and release of light metal ions (e.g., Li+) and capacity components obtained upon pptn. and dissoln. of light metals (e.g., Li metal), and **separators** comprising microporous membranes having porosity 25-45%. Preferably, the **separators** contain polyolefins. The **batteries** show high energy d., long cycle life, and good **shutdown** characteristics.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

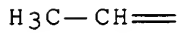
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M004-02; H01M004-58; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery** anode **separator** microporous polyolefin; **shutdown** lithium **battery** **separator** microporous polyolefin
IT Carbonaceous materials (technological products)
(anode; secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT Secondary **batteries**
(lithium; secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT Membranes, nonbiological
(microporous; secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT Secondary **battery separators**
(secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT Polyolefins
(secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT 7782-42-5, Graphite, uses
(anode; secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(secondary nonaq. electrolyte **batteries** using microporous polyolefin **separators** having **shutdown** function)

L50 ANSWER 6 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 136:203093 HCA Full-text
TI **Separator** for nonaqueous electrolyte secondary **battery**
IN Shinohara, Yasuo; Nishida, Yasunori; Takahashi, Tsutomu
PA Sumitomo Chemical Company, Limited, Japan
SO Eur. Pat. Appl., 10 pp.
CODEN: EPXXDW
DT Patent
LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1184917	A2	20020306	EP 2001-119788	20010828
				<--	
	EP 1184917	A3	20050817		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2002151044	A	20020524	JP 2001-252810	20010823
				<--	
	TW 595035	B	20040621	TW 2001-90120999	20010827
				<--	
	CA 2356033	A1	20020228	CA 2001-2356033	20010828
				<--	
	US 2002055036	A1	20020509	US 2001-940474	20010829
				<--	
	CN 1340868	A	20020320	CN 2001-137150	20010830
				<--	
PRAI	JP 2000-260556	A	20000830	<--	

AB In a **separator** for a nonaq. electrolyte secondary **battery**, the **separator** comprises a **shut- down** layer, a heat-resistant microporous layer, and a spacer having the form of particles, fibers, net or porous film on the surface of the heat-resistant microporous layer. The **separator** has a **shut-down** function, heat-resistance and excellent electrochem. oxidn. resistance, and a **battery** having improved safety can be produced.

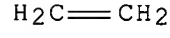
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** for nonaq. electrolyte secondary **battery**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

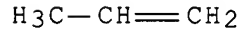
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **separator** nonaq electrolyte secondary **battery**;
safety nonaq electrolyte secondary **battery**
IT Polyamide fibers, uses
(aramid; **separator** for nonaq. electrolyte secondary **battery**)
IT Polyesters, uses
(arom.; **separator** for nonaq. electrolyte secondary **battery**)
IT Polymers, uses
(heat-resistant; **separator** for nonaq. electrolyte secondary **battery**)
IT Secondary **batteries**
Secondary **battery separators**
(**separator** for nonaq. electrolyte secondary **battery**)
IT Fluoropolymers, uses
Polycarbonates, uses
Polyesters, uses
Polyolefins
(**separator** for nonaq. electrolyte secondary **battery**)
IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate

623-53-0, Ethyl methyl carbonate 9004-34-6, Cellulose, uses 21324-40-3, Lithium hexafluorophosphate 25038-59-9, Polyethylene terephthalate, uses
(**separator** for nonaq. electrolyte secondary **battery**)

IT 9000-11-7, Cmc **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer
(**separator** for nonaq. electrolyte secondary **battery**)

L50 ANSWER 7 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 133:32736 HCA Full-text
TI Process for preparation of polyolefin blend porous film **separator** for secondary **battery**
IN Lee, Sang-Young; Ahn, Byeong-In; Song, Heon-Sik; Kim, Myung-Man
PA LG Chemical Ltd., S. Korea
SO PCT Int. Appl., 23 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2000034384	A1	20000615	WO 1999-KR750	19991208 <--
W: CN, JP, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
KR 2000038611	A	20000705	KR 1998-53667	19981208 <--
EP 1157067	A1	20011128	EP 1999-959965	19991208 <--
EP 1157067	B1	20040303		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002531669	T	20020924	JP 2000-586825	19991208 <--

JP 3639535 B2 20050420
US 2006188786 A1 20060824 US 2005-59749
200502
17
<--

PRAI KR 1998-53667 A 19981208 <--
WO 1999-KR750 W 19991208 <--
US 2001-857762 B3 20010608 <--

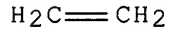
AB It is an object of the present invention to provide a microporous film made of polyolefin blend having outstanding electrolyte wettability, puncture strength, and **shut down** characteristics, its manufg. method, and a secondary **battery separator**. The present invention provides a microporous film and a method for manufg. the same characterized in that the microporous film is manufd. by molding a film with a mixed blend contg. two or more of polyolefins by using a casting or film blowing, and that a microporous film is manufd. by annealing and stretching the molded film, and the microporous film is surface treated by irradiating it with ionizing radiation either before or after the pore formation in order to achieve the above object. Furthermore, the secondary **batteries** in which this microporous film is applied as a **separator**, esp. lithium ion secondary **batteries** or alkali secondary **batteries**, are safer due to their outstanding puncture strength, **shut down** characteristics, and **separator** melt resistance under large external elec. current flows, can benefit from a great increase in productivity due to the excellent **separator** electrolyte wettability during **battery** assembly, and can achieve high charging d. due to their thin **separator** and high mech. strength.

IT **9002-88-4**, Polyethylene
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

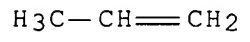


IT **9003-07-0**, Polypropylene
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08L023-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 37
ST lithium **battery separator** polyolefin blend
porous film
IT Ions
Plasma
(ionizing radiation; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT Gamma ray
(irradn.; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT Secondary **batteries**
(lithium; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT Casting of polymeric materials
Electron beams
Molding of plastics and rubbers
Secondary **battery separators**
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT Polyolefins
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT Ionizing radiation
(surface treatment; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT **9002-88-4**, Polyethylene
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT **9003-07-0**, Polypropylene
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)
IT 74-82-8, Methane, uses 75-73-0, Carbon tetrafluoride 124-38-9,

Carbon dioxide, uses 630-08-0, Carbon monoxide, uses 1333-74-0, Hydrogen, uses 7727-37-9, Nitrogen, uses 7782-44-7, Oxygen, uses 10024-97-2, Nitrogen oxide n2o, uses
(process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)

IT 12184-90-6, uses 12269-46-4, Nitrogen oxide ion (N2O1+) 14234-48-1, Helium(1+), uses 14337-01-0, Atomic oxygen anion, uses 14782-23-1, Neon(1+), uses 16915-28-9, Krypton(1+), uses
(surface treatment by irradn. of particles of; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)

IT 183748-02-9, Electron
(surface treatment by irradn. of particles of; process for prepn. of polyolefin blend porous film **separator** for secondary **battery**)

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 8 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 132:323909 HCA Full-text
TI **Separator** using polymer membrane composite for secondary nonaqueous electrolyte **battery**
IN Watari, Yukihiro; Aoki, Takashi; Nakamitsu, Kazuhiro; Mizutani, Minoru
PA Japan Storage Battery Co., Ltd., Japan; GS Melcotec K. K.
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2000133236	A	20000512	JP 1998-302666	19981023

<--

PRAI JP 1998-234743 A 19980820 <--

AB The **separator** comprises membranes of (A) polyethylene and (B) polymers having m.p. higher than that of A, where wt. ratio of A/B = (1-3)/1. Alternatively, the **separator** comprises ≥3 polymer layers consisting of porous polyethylene layers and porous polypropylene layers, and the polyethylene layers are placed on the both sides of the **separator**. The **battery** using the **separator** has good **shutdown** function and shape retention at the time of temp. rising to prevent short circuit.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene

(**separator** using polymer membrane composite for secondary nonaq. electrolyte **battery**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

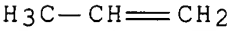
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M010-24
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST polypropylene polyethylene membrane composite **separator** **battery**
IT Membranes, nonbiological
(multilayer; **separator** using polymer membrane composite for secondary nonaq. electrolyte **battery**)
IT Secondary **battery separators**
(**separator** using polymer membrane composite for secondary nonaq. electrolyte **battery**)
IT Laminated plastics, uses
(**separator** using polymer membrane composite for secondary nonaq. electrolyte **battery**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** using polymer membrane composite for secondary nonaq. electrolyte **battery**)

L50 ANSWER 9 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 131:274254 HCA Full-text
TI Trilayer **shutdown battery separator** and process of manufacture
IN Yu, Ta-Hua
PA Celgard LLC, USA
SO Eur. Pat. Appl., 9 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 951080	A1	19991020	EP 1999-106727	19990401 <--
	EP 951080	B1	20010725		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 6080507	A	20000627	US 1998-59126	19980413 <--
	CA 2266152	A1	19991013	CA 1999-2266152	19990318 <--
	TW 480766	B	20020321	TW 1999-88104233	19990318 <--
	JP 11329390	A	19991130	JP 1999-102177	19990409 <--
	JP 2004014526	A	20040115	JP 2003-308656	20030901 <--
PRAI	US 1998-59126	A	19980413 <--		
	JP 1999-102177	A3	19990409 <--		

AB A trilayer **shutdown battery separator** is provided having 2 strength layers sandwiching a **shutdown** layer that is made by a particle stretch method. The preferred method of making such a trilayer **separator** comprises making microporous strength layers; forming a

microporous **shutdown** layer by a particle stretch method; and bonding two microporous strength layers and one microporous **shutdown** layer into the trilayer **battery separator** wherein the first and third layers are strength layers, and the second membrane is a microporous **shutdown** layer made by a particle stretch method.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(trilayer **shutdown battery separator** and process of manuf.)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

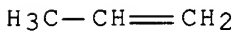
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B01D067-00; B01D071-26; B29C055-02; B32B027-32

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **battery separator** trilayer **shutdown** layer

IT Secondary **battery separators**
(trilayer **shutdown battery separator** and process of manuf.)

IT 1592-23-0, Calcium stearate
(calcium carbonate filler particles surface-treated with; trilayer **shutdown battery separator** and process of manuf.)

IT 471-34-1, Calcium carbonate, uses
(filler; trilayer **shutdown battery separator** and process of manuf.)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(trilayer **shutdown battery separator** and process of manuf.)
RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 10 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 131:202275 HCA Full-text
TI Trilayer microporous **shutdown battery separator** with two strength layer membranes sandwiching one **shutdown** layer membrane
IN Spotnitz, Robert M.
PA Celgard LLC, USA
SO Eur. Pat. Appl., 8 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 942480	A1	19990915	EP 1999-104437	19990305
			<--	
EP 942480	B1	20030507		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
US 6180280	B1	20010130	US 1998-41163	19980312
			<--	
TW 429645	B	20010411	TW 1999-88100519	19990114
			<--	
CA 2259786	A1	19990912	CA 1999-2259786	19990119
			<--	
JP 11317212	A	19991116	JP 1999-66702	19990312
			<--	

PRAI US 1998-41163 A 19980312 <--

AB A trilayer **shutdown battery separator** is provided having two microporous strength layer membranes sandwiching one microporous **shutdown** layer membrane. The strength layers are made by a stretch method. The **shutdown** layer is made by a phase inversion method. The preferred method of making such a trilayer **separator** comprises: making microporous strength layers by a stretch method; forming a microporous **shutdown** layer by phase inversion process; and bonding two microporous strength layers and one microporous **shutdown** layer into the trilayer **battery separator.**

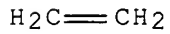
IT **9002-88-4,** Polyethylene **9003-07-0,** Polypropylene
(trilayer microporous **shutdown battery separator** with two strength layer membranes sandwiching one **shutdown** layer membrane)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

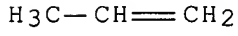


RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B01D067-00; B01D069-12; B01D071-26; B29C055-02; B32B005-18; B32B027-32; B32B031-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **battery separator** trilayer microporous **shutdown**

IT Primary **battery separators**
Secondary **battery separators**
(trilayer microporous **shutdown battery separator** with two strength layer membranes sandwiching one **shutdown** layer membrane)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(trilayer microporous **shutdown battery separator** with two strength layer membranes sandwiching one **shutdown** layer membrane)
RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 11 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 131:130978 HCA Full-text
TI Porous film laminates with high strength and heat resistance
IN Shimatani, Shunichi
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11207888	A	19990803	JP 1998-10728	19980122 <--
PRAI JP 1998-10728		19980122 <--		

AB The composites, useful for **battery separators**, filters, etc., comprise fluoropolymer porous films laminated with polyolefin porous films via adhesive porous layers having lower m.p. than the polyolefin films. Thus, a 5-layer porous composite comprising hydrophilized NTF 1033 (fluoropolymer film), 9:1 HDPE-polypropylene blend, and polypropylene film showed sticking strength 650 g, **shutdown** temp. 125°, and heat resistance at 300°.
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(porous film; porous film laminates with high strength and heat resistance)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

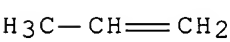
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM B32B027-30
ICS B01D039-16; B32B005-32; B32B027-32; H01M002-16
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST porous fluoropolymer polyolefin film laminate adhesive; HDPE polypropylene adhesive porous film laminate; heat resistant porous film laminate filter; **battery separator** porous film laminate
IT Heat-resistant materials
Laminated plastic films
Membrane filters
Primary **battery separators**
Secondary **battery separators**
(porous film laminates with high strength and heat resistance)
IT 9002-84-0 **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(porous film; porous film laminates with high strength and heat resistance)

L50 ANSWER 12 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 131:33861 HCA Full-text
TI Penta-layer **battery separator**
IN Yu, Wei-ching; Nguyen, Khuy V.; Hux, Shawn E.; Cook, Pierre C.; Call, Ronald W.
PA Celgard Llc, USA
SO Eur. Pat. Appl., 11 pp.
CODEN: EPXXDW
DT Patent

LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 924780	A1	19990623	EP 1998-123315	19981208
				<--	
	EP 924780	B1	20010711		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	TW 420886	B	20010201	TW 1998-87118270	19981103
				<--	
	CA 2253017	A1	19990619	CA 1998-2253017	19981105
				<--	
	JP 11250888	A	19990917	JP 1998-359899	19981218
				<--	
PRAI	US 1997-995205	A	19971219 <--		

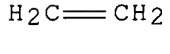
AB A **battery separator** comprises 5 microporous membranes stacked together, where the first, third, and fifth membranes are strength layers, and second and fourth membranes are **shutdown** layers. The first, third, and fifth membranes are polypropylene, and the second and fourth membranes are polyethylene.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(penta-layer **battery separator**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

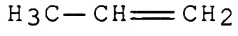
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B01D069-12; B32B027-32; B01D067-00; B32B031-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** polypropylene polyethylene pentalayer
IT Primary **battery separators**
Secondary **battery separators**
(penta-layer **battery separator**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(penta-layer **battery separator**)
RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 13 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 130:297704 HCA Full-text
TI Heat-resistant multilayer porous films with improved wettability for electrolytic solutions
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11115084	A	19990427	JP 1997-280190	19971014 <--

PRAI JP 1997-280190 19971014 <--

AB Title ≥3-layer films, suitable for **separators** for **batteries** or electrolytic capacitors, satisfy Gurley value 100-700 s/100 mL and comprise high m.p. porous polyolefins and low m.p. porous polyolefins

with their m.p. difference ≥20°. Surface layers of the films are prepd. from porous polyethylene having elastic modulus ≥104 dyne/cm2 within range of **shutdown** temps. The multilayer films show good **shutdown** properties. Thus, Ube Polypro F 103EA (polypropylene; m.p. 166°; MI 3) film was sandwiched between Hizex 5202B (polyethylene; m.p. 132°; MI 0.33), stretched, relaxed, and heat set to give 3-layer porous film showing porosity 47%, static friction coeff. 0.38, and contact angle 46°.

IT **9003-07-0**, Ube Polypro F 103EA
(middle layer; heat-resistant multilayer porous films with improved wettability for electrolytic solns.)

RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

IT **9002-88-4**, Hizex 5202B
(surface layer; heat-resistant multilayer porous films with improved wettability for electrolytic solns.)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM B32B005-32
ICS B32B005-18; B32B027-32; H01G009-02; H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52, 76

ST polyethylene polypropylene heat resistant porous film; polypropylene multilayer film wettability **battery separator**; polyolefin multilayer film electrolytic capacitor **separator**

; **shutdown** property porous polyethylene film

IT Electrolytic capacitors
Secondary **battery separators**
(heat-resistant multilayer porous films with improved wettability for electrolytic solns.)

IT **9003-07-0**, Ube Polypro F 103EA
(middle layer; heat-resistant multilayer porous films with improved wettability for electrolytic solns.)

IT **9002-88-4**, Hizex 5202B
(surface layer; heat-resistant multilayer porous films with improved wettability for electrolytic solns.)

L50 ANSWER 14 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 130:238544 HCA Full-text
TI Porous polymer films for **battery separators** and electrolytic capacitors
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11060764	A	19990305	JP 1997-226240	19970822 <--
JP 3536607	B2	20040614		

PRAI JP 1997-226240 19970822 <--

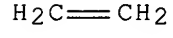
AB The title films in oriented forms satisfy condition of having elastic modulus ≥104 dyne/cm2 within range of **shutdown** temps. Thus, Hi-zex 5202B (HDPE) film was sandwiched between UBE Polypro F 103EA films to give a 3-layer film, which was stretched 20% at 35°, subsequently 180% at 126°, relaxed 17%, and heat-set. The resulting porous film showed Gurley value 550 s/100 mL, porosity 45%, tensile strength (ASTM D 822) 15 kg/mm2 in the machine direction (MD) and 1.3 kg/mm2 in the transverse direction (TD), and shrinkage ratio after 1-h storage at 135° 41% and -2% in the MD and TD, resp.

IT **9002-88-4**, Hi-Zex 5202B
(middle layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

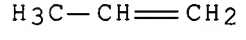
CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, UBE Polypro F 103EA
(outer layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-00
ICS B32B005-18; B32B005-32; H01G009-02; H01M002-16; B29C055-02; B29K023-00; B29L009-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST polypropylene porous multilayer film manuf **battery separator**; HDPE porous film manuf electrolytic capacitor **separator**
IT Porous materials
(films; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Laminated plastic films
Secondary **battery separators**
(manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Films
(porous; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Electrolytic capacitors
(**separators**; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)

IT **9002-88-4**, Hi-Zex 5202B
(middle layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT **9003-07-0**, UBE Polypro F 103EA
(outer layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)

L50 ANSWER 15 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 130:238543 HCA Full-text
TI Porous polymer films for **battery separators** or electrolytic capacitors
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11060763	A	19990305	JP 1997-226239	19970822 <--

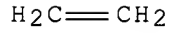
PRAI JP 1997-226239 19970822 <--

AB The title films in oriented forms satisfy condition of having viscosity ≥103 P within range of **shutdown** temps. Thus, Hi-zex 5202B (HDPE) film was sandwiched with UBE Polypro F 103EA films to give a 3-layer film, which was stretched 20% at 35°, subsequently 180% at 126°, relaxed 17%, and heat-set. The resulting porous film showed Gurley value 550 s/100 mL, porosity 45%, tensile strength (ASTM D 822) 15 kg/mm2 in the machine direction (MD) and 1.3 kg/mm2 in the transverse direction (TD), and shrinkage ratio after 1-h storage at 135° 41% and -2% in the MD and TD, resp.

IT **9002-88-4**, Hi-Zex 5202B
(middle layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

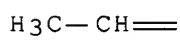
CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, UBE Polypro F 103EA
(outer layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM C08J009-00
ICS B32B005-18; B32B005-32; H01G009-02; H01M002-16
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST polypropylene porous multilayer film manuf **battery separator**; HDPE porous film manuf electrolytic capacitor
IT Porous materials
(films; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Laminated plastic films
Secondary **battery separators**
(manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Films
(porous; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT Electrolytic capacitors
(**separators**; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT **9002-88-4**, Hi-Zex 5202B
(middle layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)
IT **9003-07-0**, UBE Polypro F 103EA
(outer layer; manuf. of porous polymer films for **battery separators** or electrolytic capacitors)

L50 ANSWER 16 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 130:84070 HCA Full-text
TI Multilayer-structured **separators** for nonaqueous-electrolyte **batteries**
IN Uetani, Yoshihiro; Ohtani, Akira
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11007935	A	19990112	JP 1997-156390	19970613 <--

PRAI JP 1997-156390 19970613 <--

AB The **separators** are porous multilayered films comprising ≥3 layers made of different materials or materials having different compns. The **separators** contg. (a) a layer of 20:80-80:20 wt. blends of incompatible resins, (b) a layer mainly consisting of a resin having m.p. ≤140°, and (c) a layer mainly consisting of material having m.p. ≥160°, with at least 1 of the outermost layer consisting of b, or (A) a layer which prevents short circuit of the electrodes due to pptn. of Li on anode during charging, (B) a layer which melts by heating to ≤140° and forms coatings on pptd. Li for prevention of **battery** reactions, and (C) a layer with maintains the **separator** shape at ≥140°, with at least 1 of the outermost layer consisting of B. Short circuit and exothermic reaction due to pptn. of Li are prevented. The **batteries** show low-temp. **shut down**, excellent high-temp. shape maintaining property, and are safe.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** component; multilayered **separators** for safe lithium secondary **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

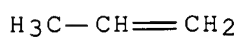
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M002-16; B32B005-32; C08J009-00; C08L023-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST safe nonaq electrolyte **battery** multilayered **separator**; lithium secondary **battery** **separator**; polymer blend porous **separator** **battery**
IT Secondary **battery separators**
(multilayered **separators** for safe lithium secondary **batteries**)
IT Polymer blends
(polypropylene-polyethylene; multilayered **separators** for safe lithium secondary **batteries**)
IT 7439-93-2, Lithium, occurrence
(prevention of harm by pptd.; multilayered **separators** for safe lithium secondary **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** component; multilayered **separators** for safe lithium secondary **batteries**)

L50 ANSWER 17 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 130:15825 HCA Full-text
TI Manufacture of 3-layered **separators** for **batteries** with good **shut-down** characteristics
IN Yu, Wei-Ching; Ficks, Shawn E.
PA HNA Holdings, Inc., USA
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10289703	A	19981027	JP 1998-102299	19980414
	US 5952120	A	19990914	US 1997-839664 <--	19970415
	CA 2233052	A1	19981015	CA 1998-2233052 <--	19980325
	EP 872900	A2	19981021	EP 1998-106208 <--	19980404
	EP 872900	A3	20000726		
	EP 872900	B1	20040929		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
PRAI	US 1997-839664	A	19970415 <--		

AB The title **separators** are manufd. by extruding polyethylene (I) precursors and polypropylene (II) precursors sep. to give 3-layered precursors contg. a layer of I between 2 layers of II, simultaneous joining and annealing, and then stretching. **Batteries** using the above **separators** are also claimed. The **separators** are obtained efficiently.

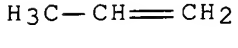
IT **9003-07-0**, Polypropylene
(Escorene PP 4292; simultaneous joining and annealing in manuf. of 3-layered **separators** for **batteries** with good **shut-down** characteristics)

RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IT **9002-88-4**, Polyethylene
(high-d., Fina HDPE 7208, Hizex HDPE 5202B; simultaneous joining and annealing in manuf. of 3-layered **separators** for **batteries** with good **shut-down** characteristics)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM H01M002-16
ICS H01M002-16; B29C047-06; B29C055-02; B29K023-00; B29L009-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST polyethylene polypropylene laminate **separator** **battery**; joining annealing polyethylene polypropylene **separator**
IT Annealing
Joining
Laminated plastic films
Secondary **battery separators**
(simultaneous joining and annealing in manuf. of 3-layered **separators** for **batteries** with good **shut-down** characteristics)
IT **9003-07-0**, Polypropylene
(Escorene PP 4292; simultaneous joining and annealing in manuf. of 3-layered **separators** for **batteries** with good **shut-down** characteristics)
IT **9002-88-4**, Polyethylene
(high-d., Fina HDPE 7208, Hizex HDPE 5202B; simultaneous joining and annealing in manuf. of 3-layered **separators** for **batteries** with good **shut-down** characteristics)

L50 ANSWER 18 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 129:290985 HCA Full-text
TI Laminated porous plastic films with high adhesive strength between layers, **battery separators** using them, and

manufacture of the films
IN Nagai, Yozo; Nishiyama, Soji; Higuchi, Hiroyuki; Matsushita, Kiichiro
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10249974	A	19980922	JP 1997-59173	19970313 <--

PRAI JP 1997-59173 19970313 <--

AB The films comprise laminated porous layers of thermoplastic polymers graft-copolymd. with unsatd. carboxylic acids and/or their anhydrides (A) and thermoplastic polymers (B). The films are manufd. by laminating layers of A and B and drawing the laminates to form pores. Thus, polypropylene (m.p. 169°) layers were laminated on both sides of an acrylic acid-grafted polyethylene (m.p. 128°) layer, heated at 150°, drawn, and heat-set at 120° to give a porous film showing **shut-down** temp. 125°, low elec. resistivity, and high adhesive strength between layers. The film was used as a **separator** for prodn. of a Li **battery** and showed low nos. of defective products.

IT **9002-88-4**, Polyethylene **9002-88-4D**, Polyethylene, maleated **9003-07-0**, Polypropylene
(manuf. of laminated porous films for Li **battery separators** with good interlaminar adhesion)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

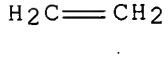
IC ICM B32B005-32
ICS B29C067-20; B32B007-02; B32B027-32; H01M002-16; B29K105-04; B29L007-00; B29L009-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST porous laminated thermoplastic film **battery separator**; polypropylene laminate lithium **battery separator**; acrylic acid grafted polyethylene laminate film
IT Porous materials
(films; manuf. of laminated porous films for Li **battery separators** with good interlaminar adhesion)
IT Laminated plastic films
Primary **battery separators**
Secondary **battery separators**
(manuf. of laminated porous films for Li **battery separators** with good interlaminar adhesion)
IT Films
(porous; manuf. of laminated porous films for Li **battery separators** with good interlaminar adhesion)
IT 108-31-6D, Maleic anhydride, reaction products with polyethylene **9002-88-4**, Polyethylene **9002-88-4D**, Polyethylene, maleated **9003-07-0**, Polypropylene 98846-22-1, Acrylic acid-ethylene graft copolymer
(manuf. of laminated porous films for Li **battery**

separators with good interlaminar adhesion)

L50 ANSWER 19 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 129:69834 HCA Full-text
TI Role of microporous **separator** in lithium ion secondary **battery**
AU Lee, Young Moo; Oh, Bookeun
CS Dept. Ind. Chem., Col. Eng., Hanyang Univ., Seoul, 133-791, S. Korea
SO Memburein (**1997**), 7(3), 123-130
CODEN: MEMBEP; ISSN: 1226-0088
PB Membrane Society of Korea
DT Journal; General Review
LA Korean
AB A review with 23 refs. The characteristics of microporous **separator** for lithium ion secondary **battery** were introduced. Microporous **separator** is a key component of a lithium ion secondary **battery** because its basic properties were related with the performance and safety of the **battery** . Up to now, stretched microporous polyolefins such as polyethylene **separator** were mainly applied. It is still required to enhance wettability and **shutdown** property. For this purpose, the application of fluorovinyl polymers and surface modification of conventional polyolefinic microporous membranes are being continuously tried.
IT **9002-88-4 9003-07-0**, Polypropylene
(role of microporous **separator** in lithium ion secondary **battery**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

$H_3C-CH=CH_2$

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
ST review lithium **battery** microporous **separator**; safety lithium **battery** microporous **separator** review
IT Fluoropolymers, uses
(fluorovinyl; role of microporous **separator** in lithium ion secondary **battery**)
IT Secondary **batteries**
(lithium; role of microporous **separator** in lithium ion secondary **battery**)
IT Porous materials
(microporous; role of microporous **separator** in lithium ion secondary **battery**)
IT Secondary **battery separators**
(role of microporous **separator** in lithium ion secondary **battery**)
IT Polyolefins
(role of microporous **separator** in lithium ion secondary **battery**)
IT **9002-88-4 9003-07-0**, Polypropylene
(role of microporous **separator** in lithium ion secondary **battery**)

L50 ANSWER 20 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 128:219459 HCA Full-text
TI Manufacture of laminate polyolefin film **separators** for **batteries**
IN Kurauchi, Hiroshi; Shimada, Junichi; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10050286	A	19980220	JP 1996-207079	19960806
	JP 3852492	B2	20061129	<--	

PRAI JP 1996-207079 19960806 <--

AB The manuf. involves the following steps; (1) individually heat treatment of a high-m.p. polyolefin film (A) and a low-m.p. polyolefin film (B) having m.p. ≥20° lower than that of A to adjust birefringence of and elastic recovery rate in 100% elongation of A (15-21) + 10-3 and 80-94%, resp., and birefringence and elastic recovery rate in 50% elongation of B (30-48) + 10-3 and 50-80%, resp., (2) alternately laminating A and B and thermally attaching them at a temp. ≥10° above than m.p. of B, (3) drawing the film successively at low temp. and at high temp. to generate pores, and (4) thermally fixing. Manuf. of a polypropylene/polyethylene alternate laminte film for **battery separators** is also claimed with a detail of processing and properties. The laminate film of desired thickness, heat shrinkage, gas-permeation rate, and **shut down** temp. can be manufd. by the method.

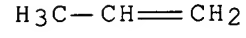
IT **9003-07-0**, Polypropylene
(film, Polypro F 103EA; manuf. of laminate polyolefin film **separators** for **batteries**)

RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



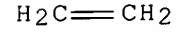
IT **9002-88-4**, Hizex 2208J
(film; manuf. of laminate polyolefin film **separators** for **batteries**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS H01M002-16; B32B027-32; C08J009-36
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** polyolefin laminate
IT Polyolefins
(film; manuf. of laminate polyolefin film **separators** for **batteries**)
IT Primary **battery separators**
Secondary **battery separators**
(manuf. of laminate polyolefin film **separators** for **batteries**)
IT **9003-07-0**, Polypropylene
(film, Polypro F 103EA; manuf. of laminate polyolefin film **separators** for **batteries**)
IT **9002-88-4**, Hizex 2208J
(film; manuf. of laminate polyolefin film **separators** for **batteries**)

L50 ANSWER 21 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 128:169820 HCA Full-text
TI Manufacture of porous polyolefin film laminates for **battery separators**
IN Kurauchi, Hiroshi; Fujii, Teruaki; Shimada, Junichi
PA Ube Industries, Ltd., Japan
SO Eur. Pat. Appl., 13 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 823740	A1	19980211	EP 1997-113558	19970806
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI			<--	
JP 10100344	A	19980421	JP 1997-12121	19970127
			<--	
JP 3381538	B2	20030304		
CA 2212469	A1	19980206	CA 1997-2212469	19970806

PRAI JP 1996-207078 A 19960806 <--
JP 1997-12121 A 19970127 <--

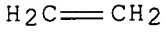
AB The laminates, suitable for **separators** in Li **batteries**, are composed of ≥3 polyolefin films, contg. ≥1 polyethylene film and ≥2 polypropylene films. The laminates have a pore vol. of 30-80%, a max. pore size of 0.02-2 μm, and a **shutdown** temp. 1-5°C lower than the m.p. of the polyethylene film. The porous polyolefin film laminate can be prepd. by heating polypropylene and polyethylene films sep., combining the films under pressure and heating, stretching twice the combined films at a relatively low temp. and then at a relatively high temp., and fixing the stretched film.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of porous polyolefin film laminates for **battery separators**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

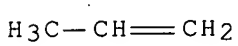
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B32B027-32
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** polyethylene polypropylene laminate **separator** manuf
IT Secondary **battery separators**

(manuf. of porous polyolefin film laminates for **battery separators**)

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(manuf. of porous polyolefin film laminates for **battery separators**)

RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L50 ANSWER 22 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 127:296243 HCA Full-text
TI Secondary nonaqueous electrolyte **batteries** with laminated **separators**
IN Takahashi, Masatoshi
PA Sanyo Electric Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 09259857	A	19971003	JP 1996-71985 <--	19960327
US 5856039	A	19990105	US 1997-824734 <--	19970326
PRAI JP 1996-71985	A	19960327 <--		

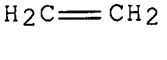
AB The **batteries** have a Li contg. multiple oxide cathode, a Li or Li intercalating anode, and an electrolyte impregnated **separator**; where the **separator** is a laminate of several porous polyethylene-polypropylene blend membranes, with ≥1 membrane having a mixing ratio of the polymers different from the other membranes. Preferably, the membrane in the center of the laminate has lower polypropylene content than other membranes. These **separators** have good **shutdown** properties.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. laminated porous polyethylene-polypropylene blend layers for secondary lithium **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

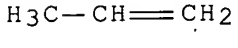
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M002-16; B32B005-32; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium **battery** polypropylene polyethylene laminate **separator**
IT Secondary **battery separators**
(**separators** contg. laminated porous polyethylene-polypropylene blend layers for secondary lithium **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. laminated porous polyethylene-polypropylene blend layers for secondary lithium **batteries**)

L50 ANSWER 23 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 127:280841 HCA Full-text
TI Porous membrane and its manufacture, and lithium ion secondary **batteries**
IN Samaru, Hajime; Heita, Reiji
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09241411	A	19970916	JP 1996-56392	199603 13
	JP 3589778	B2	20041117	<--	
PRAI	JP 1996-56392		19960313	<--	

AB Claimed membranes comprise polyethylene and polypropylene, which are immersed with electrolyte solns. and placed with electrodes on both sides for showing max. temp. (m.p. of polyethylene + 20°) by applying a.c. resistance heating with 10-50°/s temp. increase. The membranes are manufd. from mixts. contg. ≥12 wt.% polyethylene having crystn. ≥60% and polypropylene having crystn. ≥70%. by uniaxial stretching. Claimed **batteries** use the membranes. The membranes provide immediate **shut down** of elec. current by melting of polyethylene and the **batteries** prevent short circuit and ignition.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(polyethylene-polypropylene porous membranes for lithium ion **batteries** with safety)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

$H_3C{-}CH{=}CH_2$

IC ICM C08J009-00
ICS H01M002-16; H01M010-40; C08L023-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium ion **battery** porous membrane; polyethylene polypropylene membrane **battery separator**
IT Secondary **batteries**
(lithium; polyethylene-polypropylene porous membranes for lithium ion **batteries** with safety)
IT Membranes, nonbiological
Safety
Secondary **battery separators**
(polyethylene-polypropylene porous membranes for lithium ion **batteries** with safety)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(polyethylene-polypropylene porous membranes for lithium ion **batteries** with safety)

L50 ANSWER 24 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 127:236742 HCA Full-text
TI Laminated polymer **separators** for **batteries**
IN Higuchi, Hiroyuki; Matsushita, Kiichiro; Nishiyama, Soji
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09219184	A	19970819	JP 1996-23810 <--	19960209
	JP 3939778	B2	20070704		
	EP 794583	A1	19970910	EP 1997-101915 <--	19970206
	EP 794583 R: DE, FR, GB	B1	20000823		
	US 5824430	A	19981020	US 1997-797298 <--	19970207
PRAI	JP 1996-23810	A	19960209	<--	

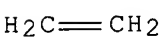
AB The **separators** have Gurley no. 200-1500 and contain a porous layer of polypropylene having wt. av. mol. wt. ≥500,000 and a porous layer contg. a material m. 100-140°. These **separators** have low resistance, high strength, and good **shutdown** properties.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. porous polypropylene layers and porous polyethylene contg. layers for secondary lithium **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

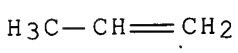
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS H01M002-16; B32B005-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** polypropylene laminate **separator**
IT Secondary **battery separators**
(**separators** contg. porous polypropylene layers and porous polyethylene contg. layers for secondary lithium **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. porous polypropylene layers and porous polyethylene contg. layers for secondary lithium **batteries**)

L50 ANSWER 25 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 127:193110 HCA Full-text
TI Porous polyethylene-polypropylene film **separators** for lithium secondary **batteries**
IN Kishii, Yutaka; Higuchi, Hiroyuki; Watanabe, Yoshinobu; Nishama, Soji
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 09213295	A	19970815	JP 1996-17523	19960202

<--

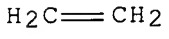
PRAI JP 1996-17523 19960202 <--

AB The title film **separators** contain 10-90:10-90 wt.% ratio of (based on sum of polyethylene and polypropylene) of polypropylene of melt index ≤0.5 and polyethylene. The **separators** have low elec. resistivity, high compression resistance, and excellent **shut down** characteristics (to prevent temp. elevation for safety).

IT **9002-88-4**, Polyethylene
(porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

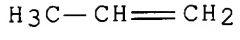
CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, Polypropylene
(porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS C08J009-00; C08L023-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium **battery separator** polyethylene polypropylene; safety lithium **battery separator** polyethylene polypropylene
IT Secondary **battery separators**
(porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)
IT 7439-93-2, Lithium, uses
(**batteries**; porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)
IT **9002-88-4**, Polyethylene
(porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)
IT **9003-07-0**, Polypropylene
(porous polyethylene-polypropylene film **separators** for Li secondary **batteries**)

L50 ANSWER 26 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 125:91342 HCA Full-text
TI **Shutdown** tri-layer **battery separator**
IN Yu, Wei-Ching
PA Hoechst Celanese Corporation, USA
SO Eur. Pat. Appl., 14 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 718901	A1	19960626	EP 1995-119694	199512 14

<--

R: DE, FR, GB, NL

EP 892448	A2	19990120	EP 1998-118113	199512 14
			<--	
EP 892448	A3	19990310		
EP 892448	B1	20020220		
R: DE, FR, GB, NL				
JP 08222197	A	19960830	JP 1995-328554	199512 18
			<--	
JP 3960437	B2	20070815		
CN 1132946	A	19961009	CN 1995-120899	199512 19
			<--	
CN 1088543	B	20020731		
US 6057060	A	20000502	US 1997-896513	199706 22
			<--	
US 6132654	A	20001017	US 1999-441418	199911 16
			<--	

PRAI	US 1994-359772	A	19941220	<--
	EP 1995-119694	A3	19951214	<--
	US 1996-650210	A1	19960520	<--
	US 1997-896513	A3	19970622	<--

AB The present invention is directed to a **shutdown** tri-layer **battery separator** comprising a first and third microporous polypropylene membrane sandwiching a microporous polyethylene membrane. The **separator** has a first and a third membrane have a greater puncture strength than the second membrane. The second membrane has a lower melting temp. than either the first or third membranes.

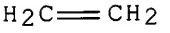
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. porous polyethylene membrane sandwiched between polypropylene membranes for **batteries**
)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

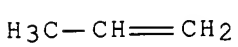
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B01D071-26; B01D067-00; B01D069-12
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery separator** porous polypropylene polyethylene laminate
IT **Batteries**, primary
Batteries, secondary
(**separators, separators** contg. porous polyethylene membrane sandwiched between polypropylene membranes for **batteries**)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separators** contg. porous polyethylene membrane sandwiched between polypropylene membranes for **batteries**)

L50 ANSWER 27 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 125:91279 HCA Full-text
TI **Shutdown**, bilayer **battery separator** and its manufacture
IN Yu, Wei-Ching; Geiger, Margaret W.
PA Hoechst Celanese Corporation, USA
SO Eur. Pat. Appl., 10 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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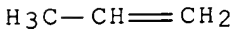
PI EP 715364 A1 19960605 EP 1995-118767
199511
29
<--
EP 715364 B1 19980401
R: DE, FR, GB, NL
JP 08227705 A 19960903 JP 1995-313891
199512
01
<--
CN 1132945 A 19961009 CN 1995-120034
199512
01
<--
PRAI US 1994-348630 A 19941202 <--
AB The **separator** comprises a 1st microporous membrane with **shutdown** capability and a 2nd microporous membrane with strength capability joined together in face-to-face contact. The face of the 1st membrane is adhered by calendaring, adhesives, or welding to the face of the 2nd membrane, and the **separator** thickness is <3 mils and its resp. puncture strength, as measured from the 2nd microporous membrane and peel strength are >1900 g-mm and >1 g/cm. The 1st membrane is made from a polyethylene material and the 2nd membrane is made from a polypropylene material.
IT **9003-07-0**, Polypropylene
(**shutdown** bilayer **battery separator**
from polyethylene and)
RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

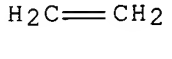
CRN 115-07-1
CMF C3 H6



IT **9002-88-4**, Polyethylene
(**shutdown** bilayer **battery separator**
from polypropylene and)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS B01D071-26; B01D067-00; B01D069-12
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** bilayer **shutdown** strength; polyethylene polypropylene bilayer **battery separator**
IT **Batteries**, secondary
(**separators**, **shutdown** polyethylene-polypropylene bilayer)
IT **9003-07-0**, Polypropylene
(**shutdown** bilayer **battery separator** from polyethylene and)
IT **9002-88-4**, Polyethylene
(**shutdown** bilayer **battery separator** from polypropylene and)

L50 ANSWER 28 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 124:33733 HCA Full-text
TI Porous multilayer film for **separator** of nonaqueous-electrolyte **battery**
IN Kurauchi, Hiroshi C. O. Hirakata; Akazawa, Tetuo C. O. Hirakata Lab; Kawabata, Akira C. O. Hirakata La
PA Ube Industries, Ltd., Japan
SO Eur. Pat. Appl., 17 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 682376	A1	19951115	EP 1995-107221	199505 12
			<--	
EP 682376	B1	20000126		
R: DE, FR, GB				

JP 07304110	A	19951121	JP 1994-98394	199405 12
			<--	
JP 3003830	B2	20000131		
JP 07307146	A	19951121	JP 1994-98395	199405 12
			<--	
JP 3011309	B2	20000221		
US 5691047	A	19971125	US 1995-440075	199505 12
			<--	
CA 2149284	C	20020430	CA 1995-2149284	199505 12
			<--	
PRAI JP 1994-98394	A	19940512	<--	
JP 1994-98395	A	19940512	<--	

AB The film comprises ≥3 united polyolefin layers, in which ≥1 layer is a polyethylene layer and ≥1 layer is a polypropylene layer which is placed in contact with the polyethylene layer. The polyolefin layers are combined to form a united structure with a peel strength of ≥3 g/15 mm, a pore vol. of 30-80%, a max. pore size of 0.2-2 μm, a **shutdown** temp. of 135-140°, and a thermal durability to maintain the **shutdown** condition to ≥180°.

IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(porous multilayer film for **separator** of nonaq.-electrolyte **battery** contg. layer of)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

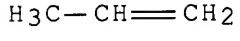
CM 1

CRN 74-85-1
CMF C2 H4

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
ICS B32B027-32; C08J005-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** porous multilayer polyolefin; polyethylene polypropylene porous multilayer **battery separator**
IT **Batteries**, secondary
(**separators**, porous multilayer film for nonaq.-electrolyte)
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(porous multilayer film for **separator** of nonaq.-electrolyte **battery** contg. layer of)

L50 ANSWER 29 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 121:302605 HCA Full-text
TI Ultrahigh-molecular-weight polyethylene porous film or sheet and its manufacture and use as a **battery separator** in a lithium **battery**
IN Fujii, Toshio; Handa, Keishin; Watanabe, Kyosuke; Nakanishi, Hiroshi; Usami, Yasushi; Sugiura, Katsuhiko
PA Mitsubishi Kasei Corp., Japan
SO Eur. Pat. Appl., 17 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 603500	A1	19940629	EP 1993-117406	199310 27
			<--	
EP 603500	B1	19980909		
R: DE, FR, GB				
CA 2109360	A1	19940622	CA 1993-2109360	

					199310 27
				<--	
	JP 06240043	A	19940830	JP 1993-276948	
					199311 05
				<--	
	JP 3307027	B2	20020724		
	JP 07029563	A	19950131	JP 1993-276947	
					199311 05
				<--	
	JP 3050021	B2	20000605		
PRAI	JP 1992-340659	A	19921221	<--	
	JP 1993-109619	A	19930511	<--	

AB A film or sheet with small residual stress is composed mainly of ultrahigh-mol.-wt. polyethylene (I) having a viscosity-av. mol. wt. of ≥500,000 and has a thickness of 10-100 μm, an air permeability of 20-2000 s/100 mL, a porosity of 15-80%, a pin puncture strength (per 25 μm of film thickness) of ≥120 g, a thermal **shutdown** temp. of 90-150°, and a heat puncture temp. of ≥160°. The film is manufd. by melt-extruding I and a plasticizer into a filmlike product, giving a deforming stress therein to effectuate melt draft, and after cooling, removing the plasticizer from the obtained film. Melt-extruding a mixt. contg. I (mol. wt. 2 x 106) and ceryl alc. to give a sheet with melt draft ratio 35.1, immersing the sheet in 80° iso-PrOH to remove the plasticizer, and heat-treatment by heated pinch rolls gave a porous film of thickness 27 μm.

IT **9003-07-0,** Polypropylene
(blends; ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)

RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

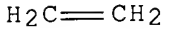
IT **9002-88-4,** Polyethylene
(ultrahigh-mol.-wt. polyethylene porous films or sheets for use

as **battery separators** in lithium **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM C08J009-28
ICS C08J009-26; H01M002-16; B29C055-02
ICA C08L023-06
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST ultrahigh mol wt polyethylene film; UHMWPE porous film; **battery separator** polyethylene porous film; lithium **battery separator** polyethylene film
IT Extrusion of plastics and rubbers
Plasticizers
(manuf. of ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)
IT **Batteries**, primary
(**separators**, ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)
IT **9003-07-0**, Polypropylene 9003-28-5, Poly-1-butene
(blends; ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)
IT 112-92-5, Stearyl alcohol 506-52-5, Ceryl alcohol
(plasticizer; ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)
IT **9002-88-4**, Polyethylene
(ultrahigh-mol.-wt. polyethylene porous films or sheets for use as **battery separators** in lithium **batteries**)

L50 ANSWER 30 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 120:139218 HCA Full-text

TI **Separator** for **batteries** and its preparation

IN Mushiake, Naofumi; Wani, Takayuki; Kato, Hiroshi; Sagara, Takeshi; Sasaki, Fumihiro

PA Japan Gore-Tex, Inc., Japan

SO Eur. Pat. Appl., 14 pp.
CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 577387	A1	19940105	EP 1993-305074 <--	19930629
	R: DE, FR, GB, IT, SE				
	JP 06076808	A	19940318	JP 1993-51549 <--	19930217
	US 5409588	A	19950425	US 1993-83158 <--	19930625
PRAI	JP 1992-194884	A	19920629	<--	
	JP 1993-51549	A	19930217	<--	

AB The **separator** is a layered structure of a fluoropolymer and polyolefin that provides a **shut-down** capability that safeguards against dangerous failure of the **battery**, such as a rupture or fire that may result from a short-circuit or other high-rate elec. discharge. The **separator** is prepd. by forming a 1-30 wt.% polyolefin soln. in a solvent, coating ≥1 porous fluoropolymer film with the soln., removing the solvent from the coating soln. to form a composite material of a porous polyolefin layer adhered to the fluoropolymer film, and treating the composite material with a hydrophilic substance.

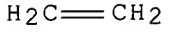
IT **9002-88-4**, Polyethylene **9003-07-0**, Polypropylene
(**separator** contg. layer of, for **batteries**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

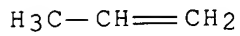
CRN 74-85-1
CMF C2 H4



RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6



IC ICM H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** fluoropolymer polyolefin;
safety **battery separator**
IT Safety
(of **batteries**, **separators** for)
IT **Batteries**, primary
Batteries, secondary
(**separators**, layered fluoropolymer-polyolefin, manuf.
of)
IT 109-93-3D, Vinyl ether, perfluoroalkyl, copolymer with
tetrafluoroethylene 116-14-3D, Tetrafluoroethylene, copolymer with
perfluoroalkyl vinyl ether 9002-83-9,
Poly(chlorotrifluoroethylene) 9002-84-0, Poly(tetrafluoroethylene)
9002-88-4, Polyethylene **9003-07-0**, Polypropylene
24937-79-9, Poly(vinylidene fluoride) 24981-14-4, Poly(vinyl
fluoride) 25067-11-2, Hexafluoropropylene-tetrafluoroethylene
copolymer
(**separator** contg. layer of, for **batteries**)

L50 ANSWER 31 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 120:58522 HCA Full-text
TI Porous polyethylene-polypropylene film, its manufacture, and its use
in **batteries** as **separator**
IN Higuchi, Hiroyuki; Matsushita, Kiichiro; Ezoe, Minoru; Shinomura,
Toshihiko
PA Nitto Denko Corp., Japan
SO Eur. Pat. Appl., 26 pp.

CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 565938	A1	19931020	EP 1993-105193	199303 29
				<--	
	EP 565938	B1	19960911		
	R: DE, FR, GB				
	JP 05331306	A	19931214	JP 1993-2636	199301 11
				<--	
	JP 3507092	B2	20040315		
	US 5385777	A	19950131	US 1993-39907	199303 30
				<--	
PRAI	JP 1992-106173	A	19920330 <--		
	JP 1993-2636	A	19930111 <--		

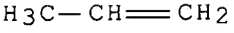
AB The film comprises 10-90 wt.% polyethylene and 10-90 wt. % polypropylene, and the polyethylene has a wt. av. mol. wt.:no. av. mol. wt. ratio of ≤10, as measured by high-temp. gel-permeation chromatog. The film has a tensile modulus ≥3500 kg/cm2 in ≥1 direction and resistivity ≤5 Ω-cm in an org. electrolyte. On heating to 120-150°, the resistivity of the film in an org. electrolyte increases to ≥200 Ω-cm and its structure changes from porous to nonporous. The film is prepd. by molding a compn. of polypropylene m. T and polyethylene m. T', annealing at T to T + 10°, and uniaxially stretching at -20 to 60°. When used as a **battery separator**, the **separator shuts down** the **battery** in case of a temp. increase due to an abnormal current.

IT **9003-07-0**, Polypropylene
(films of polyethylene and, for **battery separators**)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

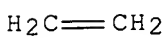
CRN 115-07-1
CMF C3 H6



IT **9002-88-4**, Polyethylene
(films of polypropylene and, for **battery separators**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS C08J005-18; C08L023-06; C08L023-12
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
ST polyethylene polypropylene film **battery separator** ; elec resistance polyethylene polypropylene film; safety **battery** polyethylene polypropylene **separator**
IT Safety
(of **batteries**, polyethylene-polypropylene films for **separators** for)
IT Electric resistance
(of polyethylene-polypropylene films, for **battery separators**, temp. effect on porosity and)
IT **Batteries**, primary
Batteries, secondary
(**separators**, polyethylene-polypropylene films, elec. resistance of, temp. effect on porosity and)
IT **9003-07-0**, Polypropylene
(films of polyethylene and, for **battery separators**)
IT **9002-88-4**, Polyethylene
(films of polypropylene and, for **battery separators**)

L50 ANSWER 32 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 119:184694 HCA Full-text

TI Plastic cased lithium **batteries**. The challenge to achieve hermeticity and safety

AU Clark, P. S.

CS ULTRALIFE Batteries, Inc., Newark, NY, 14513, USA

SO Proceedings of the International Power Sources Symposium (**1992**), 35th, 4-6
CODEN: PIPSEG

DT Journal

LA English

AB Hermetically sealed Ultralife Li/MnO2 **batteries** were designed using an interconnect cover which isolates and connects 3 cells in series (9 V) or parallel (3 V). The plastic interconnect is made of modified HDPE and the metal contacts are made of AISI 316. Ultrasonic welding was used to assemble the components; the welding process was controlled by measuring the collapse of material to adjust the power. The HDPE provides for low-cost hermetic seal, and an Al label case was used to reduce water and solvent permeability. The ultrasafe safety **separator shutdown** mechanism consists of a microporous polypropylene film with a polypropylene fiber back, all coated with a fusible material that m. 91°, closing off the pores and limiting ion flow. The **battery** is an ultrasafe, long-life Li power source for consumer, industrial, and military applications.

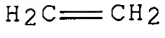
IT **9002-88-4**, Polyethylene
(high-d., modified, interconnect cover, in sealed lithium-manganese dioxide **batteries**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IT **9003-07-0**, Polypropylene
(microporous, safety **separator** contg., in **shut -down** device of lithium sealed **batteries**)

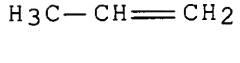
RN 9003-07-0 HCA

CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1

CMF C3 H6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST lithium manganese dioxide sealed **battery**; polyethylene interconnect lithium sealed **battery**; polypropylene safety **separator** lithium **battery**; ultrasound welding hermetically sealed **battery**

IT Seals (mechanical)
(modified HDPE and aluminum, in ultrasound-welded lithium **batteries**)

IT Polypropene fibers, uses
(safety **separator** contg., in **shut-down** device of lithium sealed **batteries**)

IT **Batteries**, primary
(sealed, lithium-manganese dioxide, with safety **shut-down** device and HDPE and aluminum seal elements)

IT **Batteries**, primary
(**separators**, polypropylene, impregnated with fusible material, for safety **shut-down**)

IT Welding of plastics
(ultrasonic, of HDPE, to lithium **battery** components, for hermetic sealing)

IT Welding
(ultrasonic, of aluminum case and steel connector snaps, to lithium **battery** components, for hermetic sealing)

IT 7429-90-5, Aluminum, uses
(case, for hermetically sealed lithium-manganese dioxide **batteries**)

IT 11107-04-3, AISI 316
(connector snaps, in hermetically sealed lithium **batteries**)

IT **9002-88-4**, Polyethylene
(high-d., modified, interconnect cover, in sealed lithium-manganese dioxide **batteries**)

IT **9003-07-0**, Polypropylene
(microporous, safety **separator** contg., in **shut-down** device of lithium sealed **batteries**)

IT 12597-69-2
(welding, ultrasonic, of aluminum case and steel connector snaps, to lithium **battery** components, for hermetic sealing)

L50 ANSWER 33 OF 33 HCA COPYRIGHT 2007 ACS on STN
AN 118:9363 HCA Full-text
TI Manufacture of laminated polymer **separators** for **batteries**
IN Higuchi, Hiroyuki; Shinomura, Toshihiko; Matsushita, Kiichiro; Ezoe, Minoru
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 04181651	A	19920629	JP 1990-309571	199011 14 <--
	JP 2883726	B2	19990419		
PRAI	JP 1990-309571		19901114 <--		

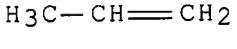
AB A laminated film comprising a layer of a high-m.p. resin and a layer of a low-m.p. resin having m.p. I is extended in 1 direction 1st at -20° to T-30° and then at T-30° to T-2° to obtain porous laminates for use as a **battery separator**. Preferably, the high-m.p. resin is polypropylene m. >150° and the low-m.p. resin is polyethylene m. 100-140°. The **separator** has good **shutdown** property to prevent damage to **batteries** at abnormally high temps.

IT **9003-07-0**, Polypropylene
(**separators** from laminates of polyethylene and, manuf. of porous, for **batteries**)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

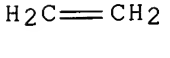


IT **9002-88-4**, Polyethylene
(**separators** from laminates of polypropylene and, manuf. of porous, for **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS H01M002-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery separator** polypropylene polyethylene
IT **Batteries**, primary
(**separators**, polypropylene-polyethylene laminates, manuf. of porous)
IT **9003-07-0**, Polypropylene
(**separators** from laminates of polyethylene and, manuf. of porous, for **batteries**)
IT **9002-88-4**, Polyethylene
(**separators** from laminates of polypropylene and, manuf. of porous, for **batteries**)

=> D L51 1-28 BIB ABS HITSTR HITIND

L51 ANSWER 1 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 142:395141 HCA Full-text
TI Porous polyolefin films for **separators** for nonaqueous electrolyte **batteries** and polymer electrolyte membranes for fuel cells
IN Emori, Hideyuki; Yamamoto, Kazunari
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2005112905	A	20050428	JP 2003-345669	

200310
03

<--

PRAI JP 2003-345669 20031003 <--

AB The films, comprising polyolefins having Mw ≥500,000 and maleated polyolefins having m.p. ≥126° measured by DSC, show porosity ≥45%, area shrinkage ≤30% after heating at 120° for 1 h, piercing strength ≥2.0 N with a 5 mm.vphi. needle, and **shut down temp** . ≥134°. The maleated polyolefins contribute to **shut down** property and improve porosity and air permeability without lowering mech. strength.

IT **9002-88-4D**, Polyethylene, maleated
(high-d.; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery** **separators** and polymer polymer electrolyte membranes for fuel cells)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IT **9002-88-4**, GUR 4012
(ultrahigh-mol.-wt.; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery** **separators** and polymer polymer electrolyte membranes for fuel cells)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-00

ICS C08L023-02; C08L023-26; H01M002-16; H01M006-18; H01M008-02; H01M008-10; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST porous maleated polyolefin film **battery separator** ; polymer **electrolyte** fuel **cell** porous maleated polyolefin film; polyolefin maleated polyolefin blend porous film

IT Porous materials
(films; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Polyolefins
(maleated; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Polymer electrolytes
(membranes; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Fuel **cells**
(polymer **electrolyte**; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Secondary **batteries**
Secondary **battery separators**
(porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Polyolefins
(porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Polymer blends
(porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT Films
(porous; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT **9002-88-4D**, Polyethylene, maleated
(high-d.; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery**

separators and polymer polymer electrolyte membranes for fuel cells)

IT 108-31-6D, Maleic anhydride, reaction product with polyethylene 401584-61-0, Adtex ER 403A 850145-16-3, Adtex DK 4200
(porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

IT **9002-88-4**, GUR 4012
(ultrahigh-mol.-wt.; porous films contg. polyolefin-maleated polyolefin blends for nonaq. electrolyte **battery separators** and polymer polymer electrolyte membranes for fuel cells)

L51 ANSWER 2 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 142:138362 HCA Full-text
TI High melt integrity **separator** for lithium ion **batteries**
IN Shi, Lie; Harleson, Ken J.; Yu, Ta-hua
PA Celgard, Inc., USA
SO U.S. Pat. Appl. Publ., 4 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005014063	A1	20050120	US 2003-621234	20030715
	US 7087343	B2	20060808		
	CA 2468218	A1	20050115	CA 2004-2468218	20040526
				<--	
	SG 126762	A1	20061129	SG 2004-3096	20040601
				<--	
	TW 269474	B	20061221	TW 2004-93116206	20040604
				<--	
	CN 1577917	A	20050209	CN 2004-10061662	20040623
				<--	

EP 1507299 A2 20050216 EP 2004-15959
200407
07
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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR
KR 2005008490 A 20050121 KR 2004-54339
200407
13
<--
JP 2005038854 A 20050210 JP 2004-207010
200407
14
<--
PRAI US 2003-621234 A 20030715 <--

AB The **battery separator** for a lithium **battery** is made from a nonwoven flat sheet material having high temp. melt integrity, a microporous membrane having low **temp. shutdown** properties, and an adhesive bonding the nonwoven flat sheet to the microporous membrane and being adapted for swelling when contacted by an electrolyte.

IT **9002-88-4**, Polyethylene
(high melt integrity **separator** for lithium ion **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM H01M002-16
ICS H01M010-50; B32B031-00
INCL 429144000; X42-9 6.2; X42-925.4; X42-925.5; X15-6 6.0
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery separator** high melt integrity
IT Adhesives
Ceramics
Coating materials
Secondary **battery separators**

Surface treatment
Wetting agents
(high melt integrity **separator** for lithium ion **batteries**)

IT Fluoropolymers, uses
Polyoxyalkylenes, uses
Polyurethanes, uses
(high melt integrity **separator** for lithium ion **batteries**)

IT Polycarbonates, uses
(high melt integrity **separator** for lithium ion **batteries**)

IT Secondary **batteries**
(lithium; high melt integrity **separator** for lithium ion **batteries**)

IT Acrylic polymers, uses
Polyamides, uses
Polyesters, uses
Polyimides, uses
Polyketones
Polyoxymethylenes, uses
Polyoxyphenylenes
Polysulfones, uses
Polythiophenylenes
(membrane; high melt integrity **separator** for lithium ion **batteries**)

IT Polyimides, uses
(polyether-, membrane; high melt integrity **separator** for lithium ion **batteries**)

IT Polyethers, uses
(polyimide-, membrane; high melt integrity **separator** for lithium ion **batteries**)

IT Plastics, uses
(thermoplastics, membrane; high melt integrity **separator** for lithium ion **batteries**)

IT **9002-88-4**, Polyethylene 9003-05-8, Polyacrylamide 9003-20-7, Polyvinyl acetate 9003-21-8, Polymethylacrylate 9003-39-8, Polyvinylpyrrolidone 9004-34-6, Cellulose, uses 9011-14-7, Pmma 24937-79-9, Polyvinylidene fluoride 25014-41-9, Polyacrylonitrile 25322-68-3, Peo 57619-91-7, Polytetraethylene glycol diacrylate
(high melt integrity **separator** for lithium ion **batteries**)

IT 84-74-2, Dibutyl phthalate 88-99-3D, Phthalic acid, ester 463-79-6D, Carbonic acid, cyclic ester
(high melt integrity **separator** for lithium ion **batteries**)

IT 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses
(high melt integrity **separator** for lithium ion **batteries**)
IT 9002-86-2, Polyvinyl chloride 9003-53-6, POlystyrene
(membrane; high melt integrity **separator** for lithium ion **batteries**)
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 3 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 142:57685 HCA Full-text
TI Polyolefin-based porous film and its uses
IN Nomi, Shunsuke; Yamamura, Takashi; Nakayama, Uryu
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2004352863	A	20041216	JP 2003-152328	20030529

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PRAI JP 2003-152328 20030529 <--

AB The porous film shows excellent breaking strength at high temp. due to crosslinked structure and shape-retaining property in the transverse direction even at high temp. The porous film is made from a crosslinked resin compn. contg. a polyolefin, and is characterized in that it has a peak of shrinkage strength in the transverse direction even at a **temp**. above **shutdown temp**. and has shrinkage strength at that peak ≤80 N/cm2. Thus, 20 parts of compn. of Norsorex NB (a norbornene polymer) 3, TPE 821 (olefin thermoplastic elastomer) 16, and ultrahigh mol. wt. polyethylene 81% was mixed with 80 parts of liq. paraffin, melt kneaded, pressed, biaxially stretched at 5:1 (MD) and 4.5:1 (TD), and heat treated 6 h at 85° to give a porous film with shrinkage strength 75 N/cm2, vs. 91 N/cm2 for the film stretched at 3.5:1 (MD) and 7:1 (TD). This porous film was used as **separator** in making **electrolytic cell**.

IT **9002-88-4**, Polyethylene
(ultrahigh-mol.-wt.; polyolefin-based porous film and uses)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-26
ICS H01G009-02; H01M002-16; H01M010-40; C08L023-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST norbornene polymer polyolefin rubber polyethylene porous film **electrolytic cell**
IT **Electrolytic cells**
(**separator**; polyolefin-based porous film and uses)
IT **9002-88-4**, Polyethylene
(ultrahigh-mol.-wt.; polyolefin-based porous film and uses)

L51 ANSWER 4 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 141:297017 HCA Full-text
TI Glass cloth-reinforced polyolefin microporous membranes with high strength and good heat resistance, and their manufacture
IN Tsujioka, Norio; Akashi, Kazuo
PA Asahi Kasei Chemical Corporation, Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2004269579	A	20040930	JP 2003-58911	20030305 <--

PRAI JP 2003-58911 20030305 <--
AB Title membranes show air permeability 10-1000 s/100 mL and porosity ≤80% and are manufd. by applying films of compns. comprising polyolefins and solvents at least on one side of a glass cloth, press-impregnating the compns. into the cloth, cooling, and removing the solvents to form microporous structures of the polyolefins. Thus, press-impregnating a glass cloth (Style 1027TF) with a film of a compn. comprising HDPE and fluidized paraffin, cooling, and removing

the paraffin gave a microporous film showing porosity 48% and air permeability 350 s/100 mL. An electrode sample comprising Ni foils and the electrolyte-immersed microporous film between them showed **shut-down temp.** 138° and neither shrinkage nor breakage after heated at 200°.

IT **9002-88-4**, Polyethylene
(high-d.; manuf. of glass-reinforced polyolefin microporous membranes with good heat resistance)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-26
ICS H01M002-16; C08L023-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52, 76
ST glass reinforced HDPE microporous membrane capacitor; **battery separator** microporous polyolefin glass fabric; heat resistance polyolefin microporous membrane permeability
IT Primary **battery separators**
(manuf. of glass-reinforced polyolefin microporous membranes with good heat resistance)
IT **9002-88-4**, Polyethylene
(high-d.; manuf. of glass-reinforced polyolefin microporous membranes with good heat resistance)

L51 ANSWER 5 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 141:91830 HCA Full-text
TI Porous film for nonaqueous electrolyte **battery separator**
IN Emori, Hideyuki; Yamamoto, Kazunari
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI	JP 2004189918	A	20040708	JP 2002-360466 200212 12 <--
	JP 3983656	B2	20070926	
PRAI	JP 2002-360466		20021212 <--	

AB The film contains crosslinked products of polyolefins with styrene-butadiene copolymers whose ≥1% of double bond is substituted with epoxy group. The film has high **shut- down** function at low **temp**. and breakage resistance at high temp.

IT **9002-88-4DP**, Polyethylene, polymers with epoxidized styrene-butadiene rubbers
(porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-26
ICS H01M002-16; H01M006-16; H01M010-40; C08L023-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **battery separator** porous film crosslinked polyolefin epoxidized polymer; epoxidized styrene butadiene copolymer polyolefin crosslinking porous film

IT Polyolefin rubber
(TPE 821, polymers with epoxidized styrene-butadiene rubbers and polyethylene; porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT Styrene-butadiene rubber, uses
(block, triblock, epoxidized, Epofriend A 1005, Epofriend A 1020, polymers with polyolefins; porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT Porous materials
(films; porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT Plastic films
Primary **battery separators**
Secondary **battery separators**
(porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT Films
(porous; porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT **9002-88-4DP**, Polyethylene, polymers with epoxidized styrene-butadiene rubbers
(porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

IT 106107-54-4P 694491-73-1P
(styrene-butadiene rubber, block, triblock, epoxidized, Epofriend A 1005, Epofriend A 1020, polymers with polyolefins; porous film contg. crosslinked products of polyolefins and epoxidized styrene-butadiene copolymers for nonaq. **battery separator**)

L51 ANSWER 6 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 138:386585 HCA Full-text
TI Porous films, **separators** for nonaqueous electrolyte **batteries**, and nonaqueous electrolyte **batteries**
IN Yamamoto, Kazunari
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2003147109	A	20030521	JP 2001-346281	200111 12
			<--	
CN 1419302	A	20030521	CN 2002-150435	200211 12

PRAI JP 2001-346281 A 20011112 <--

AB Title films have crosslinked structures contg. polyolefin resins, when the thickness change is measured with a penetration probe type thermo-mech. analyzer (probe diam. 1 mm, load 70 g, and programming rate 2°/min from room temp.), for the thickness at the min. temp. (if there is no min. temp. then the temp. at inflection point) which the thickness is min. at 100-150°, the films have a redescent temp. which the increased thickness has min. thickness at the min. temp. ≥250°. Thus, 20 parts polymer compn. comprising 6% Norsorex NB powder (norbornene polymer with Mw ≥2,000,000) and 94% polyethylene with Mw 3,000,000 and 80 parts liq. paraffin were kneaded at 160° for 60 min and processed into a sheet-shaped article at 0°, which was heat-pressed at 117°, stretched 3.8-folds in the length and width direction resp. at 117°, a solvent was removed with heptane, and heat-treated at 85° for 6 h and 125° for 2 h to give a 25 μm-thick crosslinked structure-contg. porous film with gel fraction 65%, air permeability 310 s/100 cc, **shutdown temp**. 149°, thickness min. temp. 141°, and thickness redescent temp. 417°.

IT **9002-88-4D**, Polyethylene, polymers with rubbers and optionally norbornene polymers
(crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-00
ICS H01M002-16; H01M006-16; H01M010-40; C08L023-00

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 39, 52

ST porous film **separator** nonaq electrolyte **battery**; crosslinked Norsorex ethylene copolymer porous film prepn

IT Butadiene rubber, uses
(Nipol BR 1241, polymers with polyethylene, crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Polyolefin rubber

(TPE 824, polymers with norbornene polymers and polyethylene, crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Secondary **batteries**
(**battery**; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Polyolefins
(crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Porous materials
(films; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Synthetic rubber, uses
(norbornene, polymers with ethene; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Films
(porous; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT Secondary **battery separators**
(prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT 9003-17-2
(butadiene rubber, Nipol BR 1241, polymers with polyethylene, crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

IT **9002-88-4D**, Polyethylene, polymers with rubbers and optionally norbornene polymers
(crosslinked; prepn. of porous films for **separators** for nonaq. electrolyte **batteries**)

L51 ANSWER 7 OF 28 HCA COPYRIGHT 2007 ACS on STN

AN 137:172374 HCA Full-text

TI Porous polyolefin films containing polymer carbamates, their use as **battery separators**, and nonaqueous electrolyte **batteries**

IN Yamamoto, Kazunari; Nomi, Shunsuke

PA Nitto Denko Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002231207	A	20020816	JP 2001-27277	200102

<--

PRAI JP 2001-27277 20010202 <--

AB Porous films consisting of 50-99 wt.% polyolefins and 1-50 wt.% comb polymers having structural repeating unit CH2CH[X(CH2)nCH3] (X = OCONH; n is integer of ≥11) are claimed. The comb polymer may be copolymers of CH3(CH2)nNCO with poly(vinyl alc.) or ethylene vinyl alc. Use of the films as **separators** in nonaq. electrolyte **batteries** and the **batteries** are also claimed. The films show excellent liq. retaining properties and excellent low-**temp**. **shut-down** properties.

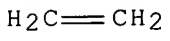
IT **9002-88-4**, Polyethylene
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**
)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS H01M002-16; C08F008-30; C08J009-26; C08L023-00; C08L029-04; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST polyolefin comb polymer blend porous film; nonaq electrolyte **battery separator** porous film; vinyl alc isocyanate comb copolymer film

IT Porous materials
(films; porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**)

IT Secondary **battery separators**
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**
)

IT Paraffin oils
Polyolefins
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**

)

IT Polymer blends
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**
)

IT Films
(porous; porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**)

IT 6325-77-5DP, Octadecylcarbamate, polyvinyl alc. derivs.
9002-89-5DP, Poly(vinyl alcohol), octadecylcarbamate derivs.
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**
)

IT **9002-88-4**, Polyethylene 146103-05-1, Peeloil 1010
(porous films of polyolefin-poly(vinyl alc.) carbamate blends of as **separators** in nonaq. electrolyte **batteries**
)

L51 ANSWER 8 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 136:387233 HCA Full-text
TI Porous polyolefin films, their manufacture, and their **battery separators** or capacitors having " **shut-down** function"
IN Nomi, Shunsuke; Yamamoto, Kazunari; Emori, Hideyuki; Yamaguchi, Mutsuko
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002155160	A	20020528	JP 2000-353671	20001121 <--

PRAI JP 2000-353671 20001121 <--

AB The porous films contain high-mol.-wt. polyolefins and preferably crosslinkable resins. and are characterized by that wt. loss in TG while rising the temp. from 30° to 220° at velocity 10°/min is 0.5-10%. In the manuf., the films are kept in a ≥50-g/Nm3 high-O3 atm. at ≤100° which lowers " **shut-down temp.** (SD **temp.**)" of the film, a temp. at which cell reaction is stopped on extraordinary current by thermal deformation of the film which leads to plug the pores. This

property has been achieved without sacrificing the porosity and gas permeability. Thus, a 15:85 UHMWPE-fluidized paraffin slurry was kneaded, extruded, sheeted, hot-pressed, biaxially drawn, treated with heptane to remove the solvent, treated at 134° for 20 min, and kept in a 100-g/Nm3 O3 at 50° to give a porous 20-μm thick film having porosity of 40%, gas permeability of 240 s/100 mL, wt. loss of 4.4%, carbonyl ratio of 1.5.

IT **9002-88-4**, Polyethylene
(ultra-high-mol.-wt.; ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having **shut-down** function)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-00
ICS H01G009-02; H01M002-16; C08L023-02

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52, 76

ST ozone treated polyolefin porous film capacitor; **battery separator** ozone treated polyolefin film; UHMWPE polynorbornene ozone treated porous film; polyethylene norbornene polymer porous film ozone treated

IT Capacitors
(film; ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having "**shut-down** function")

IT Synthetic rubber, uses
(norbornene, Norsorex NB; ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having **shut-down** function)

IT Plastic films
Secondary **battery separators**
(ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having "**shut-down** function")

IT Polyalkenamers
(ozone-treated porous polyolefin films, their manuf., and their

battery separators or capacitors having "
shut-down function")

IT Polyolefins
(ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having "
shut-down function")

IT **9002-88-4**, Polyethylene
(ultra-high-mol.-wt.; ozone-treated porous polyolefin films, their manuf., and their **battery separators** or capacitors having **shut-down** function)

L51 ANSWER 9 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 136:326565 HCA Full-text
TI Fine porous polyolefin film and manufacturing method thereof
IN Son, Dong Woo; Ko, Gyung Jin; Lee, Yong Hwa
PA SKC Co., Ltd., S. Korea
SO Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7
DT Patent
LA Korean
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI KR 2000015144	A	20000315	KR 1998-34887	19980827 <--

PRAI KR 1998-34887 19980827 <--

AB A method is provided to simply and economically manuf. a fine porous polyolefin film which is used as the sepn. film for a secondary **battery** with improved **shutdown** property and melt bonding property and excellent mech. strength by a heat bonding method. The fine porous polyolefin film is formed by co-extruding and layering an ethylene-propylene copolymer melt that contains dispersively a polypropylene group copolymer melt and an org. liq. The film is made from the polypropylene group copolymer and has a central layer forming many fine pores with av. diam. of 0.1-1 μm and an ethylene-propylene copolymer. Also the film can be used as a sepn. film for lithium ion second **battery** since **shutdown** initial **temp**. is less than 120° and melt bonding property and mech. intensity are excellent.

IT **9003-07-0**, Polypropylene
(fine porous polyolefin film and manufg. method thereof)

RN 9003-07-0 HCA
CN 1-Propene, homopolymer (CA INDEX NAME)

CM 1

CRN 115-07-1
CMF C3 H6

IC ICM B32B027-32
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST secondary **battery separator** porous polypropylene film
IT Secondary **batteries**
(lithium; fine porous polyolefin film and manufg. method thereof)
IT **9003-07-0**, Polypropylene 9010-79-1, Ethylene-propylene copolymer
(fine porous polyolefin film and manufg. method thereof)

L51 ANSWER 10 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 136:312618 HCA Full-text
TI Heat-resistant porous films having **shutdown** function at low **temperature**, and **battery separators** and secondary nonaqueous electrolyte **batteries** using them
IN Yamamoto, Kazunari; Nomi, Shunsuke
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002121313	A	20020423	JP 2000-318399	200010 18

<--

PRAI JP 2000-318399 20001018 <--

AB The films comprise resin compns. contg. 1-50 wt.% polybutadiene (cis-1,4 content ≥30 mol%) and 1-50 wt.% polyolefins, thermoplastic elastomers, and/or graft copolymers. Thus, a porous film comprising Nipol BR 1220 (cis-1,4-polybutadiene) 13, polyethylene (mol. wt. 300,000) 50, and polyethylene (mol. wt. 3,000,000) 37 wt.% showed good gas permeability, **shutdown temp**. 128°, and breaking resistance at 214°.

IT **9002-88-4**, Polyethylene
(polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-28
ICS C08L009-00; C08L023-00; C08L051-00; C08L101-00; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39
ST polybutadiene polyethylene porous film **battery separator**; thermoplastic elastomer cis polybutadiene **battery separator**
IT Butadiene rubber, uses
(Nipol BR 1241; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Polyolefin rubber
(TPE 821; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Heat-resistant materials
(films, porous; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Films
(heat-resistant, porous; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Butadiene rubber, uses
(of cis-1,4-configuration, Nipol BR 1220; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Secondary **batteries**
Secondary **battery separators**
(polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)

IT Polyolefins
Thermoplastic rubber
(polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT Plastic films
(porous; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT 9003-17-2
(butadiene rubber, Nipol BR 1241; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT 9003-17-2
(butadiene rubber, of cis-1,4-configuration, Nipol BR 1220; polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)
IT **9002-88-4**, Polyethylene 110807-37-9, Modiper A 1200
(polybutadiene-based heat-resistant porous films for secondary nonaq. electrolyte **battery separators**)

L51 ANSWER 11 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 135:109726 HCA Full-text
TI Polyethylene porous membrane and its manufacture for **battery separator** and filter
IN Kaimai, Norimitsu; Funaoka, Hidehiko; Kobayashi, Shigeaki; Takita, Kotaro; Kono, Koichi
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001200082	A	20010724	JP 2000-7006	20000114 <--

PRAI JP 2000-7006 20000114 <--

AB The membrane consists of a compn. contg. (a) wt. av. mol. wt. ≥5 + 105 ultrahigh mol. wt. polyethylene or its mixt. with polyethylene having wt. av. mol. wt. ≥1 + 104 and <5 + 105 and (b) low. mol. wt. polyethylene having wt. av. mol. wt. 1 + 103 to 4 + 103 with (a)/(b) wt. ratio 95/5 to 50/50 and has gel ratio 10-80%, which is crosslinked by ionizing radiation. A **separator** contg. the membrane and a **battery** using the **separator** are also claimed. A filter contg.

the membrane is also claimed. The membrane is manufd. by following steps; kneading the polyethylene compn. with a solvent; extruding the polyethylene soln. from a die lip and then cooling to give a gelled mixt.; stretching the mixt. and removing the solvent; drying the resulting film and then crosslinking by ionizing radiation. The membrane has high strength and the resulting **battery** has low **shut-down temp** ., high melt-down temp., and safety.

IT **9002-88-4**, Polyethylene
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-00
ICS C08J003-28; C08J009-28; C08L023-06; H01M002-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 47

ST polyethylene porous membrane manuf ionizing radiation crosslinking; UHMWPE polyethylene compn membrane manuf; **battery separator** safety polyethylene porous membrane manuf; filter polyethylene porous membrane manuf

IT Crosslinking
Filters
Ionizing radiation
Primary **batteries**
Primary **battery separators**
Safety
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

IT **9002-88-4**, Polyethylene
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

L51 ANSWER 12 OF 28 HCA COPYRIGHT 2007 ACS on STN

AN 135:109720 HCA Full-text

TI Polyethylene porous membrane and its manufacture for **battery separator** and filter

IN Kaimai, Norimitsu; Funaoka, Hidehiko; Kobayashi, Shigeaki; Takita, Kotaro; Kono, Koichi
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001200081	A	20010724	JP 2000-7002	20000114

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PRAI JP 2000-7002 20000114 <--

AB The membrane consists of a compn. contg. (a) wt. av. mol. wt. ≥5 + 105 ultrahigh mol. wt. polyethylene or its mixt. with high-d. polyethylene having wt. av. mol. wt. ≥1 + 104 and <5 + 105 and (b) low.-d. polyethylene having wt. av. mol. wt. 1 + 104 to 5 + 105 with (a)/(b) wt. ratio 95/5 to 50/50 and has gel ratio 10-80%, which is crosslinked by ionizing radiation. A **separator** contg. the membrane and a **battery** using the **separator** are also claimed. A filter contg. the membrane is also claimed. The membrane is manufd. by following steps; kneading the polyethylene compn. with a solvent; extruding the polyethylene soln. from a die lip and then cooling to give a gelled mixt.; stretching the mixt. and removing the solvent; drying the resulting film and then crosslinking by ionizing radiation. The membrane has high strength and the resulting **battery** has low **shut-down temp** ., high melt-down temp., and safety.

IT **9002-88-4**, Polyethylene
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-00

ICS B29C067-20; C08J009-28; C08L023-06; H01M002-16; B29K023-00; B29K105-04; B29L007-00; B29L031-36

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 47

ST polyethylene porous membrane manuf ionizing radiation crosslinking; UHMWPE HDPE LDPE LLDPE compn membrane manuf; **battery separator** safety polyethylene porous membrane manuf; filter polyethylene porous membrane manuf

IT Crosslinking
Filters
Ionizing radiation
Primary **batteries**
Primary **battery separators**
Safety
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

IT Linear low density polyethylenes
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

IT 74-85-1D, Ethene, polymers with α-olefins **9002-88-4**, Polyethylene
(polyethylene porous membrane crosslinked by ionizing radiation for **battery separator** and filter)

L51 ANSWER 13 OF 28 HCA COPYRIGHT 2007 ACS on STN

AN 134:341376 HCA Full-text

TI Manufacture of porous films employing ultrahigh-molecular-weight polyolefins for **battery separators**

IN Nomi, Toshihiro; Yamamoto, Kazunari; Fujita, Shigeru; Uetani, Yoshihiro; Emori, Hideyuki

PA Nitto Denko Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001131328	A	20010515	JP 1999-310690	19991101 <--

PRAI JP 1999-310690 19991101 <--

AB The process comprises ≤110° heat treatment on porous films of polyolefins with Mw ≥500,000 and ring-opening polymers of unsatd. condensed alicyclic compds. The films show low **shut-down temp.** and

high breaking temp. Thus, a 15:85 (%) compn. of Norsorex NM (norbornene polymer) and polyethylene (Mw 2,000,000) was slurried with paraffin, kneaded not pressed, biaxially stretched, and heated at 95° in air to give a porous film showing porosity 51%, air permeability 390 s/100 cc, **shut-down temp.** 144°, and breaking temp. 244°.

IT **9002-88-4**, Polyethylene
(ultrahigh-mol.-wt.; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-26
ICS C08J009-26; C08L023-00; C08L065-00; H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST ultrahigh mol wt polyolefin porous film; **battery separator** porous polyolefin film; norbornene polymer polyethylene blend **battery separator**

IT Porous materials
(films; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT Heat treatment
Secondary **battery separators**
(manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT Polymer blends
(manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT Synthetic rubber, uses
(norbornene, Norsorex NB; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT Films
(porous; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT Polyolefins
(ultrahigh-mol.-wt.; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT 498-66-8D, Norbornene, polymers
(manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

IT **9002-88-4**, Polyethylene
(ultrahigh-mol.-wt.; manuf. of porous films employing ultrahigh-mol.-wt. polyolefins for **battery separators**)

L51 ANSWER 14 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 134:208929 HCA Full-text
TI Porous plastic films for **battery separators** with improved permeability and low **shut-down temperature** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers
IN Yamamoto, Kazunari; Yamaguchi, Mutsuko; Uetani, Yoshihiro; Nomi, Shunsuke; Emori, Hideyuki
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001059036	A	20010306	JP 1999-235591	19990823

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PRAI JP 1999-235591 19990823 <--

AB The porous films comprise matrix polymers and crosslinkable reactive polymers (B) dispersed in the matrix polymers in the form of scales or thin scales, or the porous films comprise the matrix polymers and B comprising ring-opened polymers of unsatd. condensed alicyclic compds. or B comprising polynorbornene rubber, or the porous films have the matrix polymers comprising polyolefins or polyolefin compns. contg. polyolefins with wt.-av. mol. wt. (Mw) ≤50x104. Thus, 18 parts of 40:60 blend of polyethylene (I) with Mw 30x104 and I with Mw 300x104, 80 parts liq. paraffin, and 2 parts Norsorex NB (II; polynorbornene) powder were kneaded, quenched by sandwiching the compn. between 2 metal plates at 0° to form a sheet, pressed at 115°, drawn in two directions at 115°, treated with heptane to form a porous film, and heat-treated 6 h at 85° to give a 25 μm-thick porous

film contg. II scaly particles dispersed in I matrix and showing air permeation rate (JIS P-8117) 460 s/100 mL, porosity 42%, piercing strength 560 g/25 μm as detd. using a specified testing machine, **shut-down temp.** 134°, and temp. for breakage 218°.

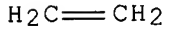
IT **9002-88-4**, Polyethylene
(film; porous plastic films for **battery separators** with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM C08J009-00
ICS C08J003-24; C08L023-00; H01G009-02; H01M002-16; C08L065-00

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polyethylene porous film **battery separator** permeability; polyolefin porous film **battery separator** permeability; heat resistance polyethylene porous film **battery separator**; polynorbornene filler polyethylene porous film **battery separator**

IT Polymers, uses
(fillers; porous plastic films for **battery separators** with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

IT Synthetic rubber, uses
(norbornene, Norsorex NB, filler; porous plastic films for **battery separators** with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

IT Fillers
Plastic films
Primary **battery separators**
Secondary **battery separators**
(porous plastic films for **battery separators**

with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

IT **9002-88-4**, Polyethylene
(film; porous plastic films for **battery separators** with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

IT 25038-76-0, Polynorbornene
(porous plastic films for **battery separators** with low **shut down temp.** and good heat resistance comprising matrix polymers and crosslinkable polymers dispersed in the matrix polymers)

L51 ANSWER 15 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 134:194390 HCA Full-text
TI Microporous films with good low-**temperature shut -down** (SD) property and high-temperature breakage resistance
IN Yamamoto, Kazushige; Fujita, Shigeru; Uetani, Yoshihiro; Noumi, Shunsuke; Emori, Hideyuki; Yamamura, Yutaka
PA Nitto Denko Corporation, Japan
SO PCT Int. Appl., 21 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001016219	A1	20010308	WO 2000-JP5779	200008 28 <--
W: JP, KR, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
EP 1153967	A1	20011114	EP 2000-955052	200008 28 <--
EP 1153967	B1	20060412		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
US 6559195	B1	20030506	US 2001-830695	200104 30

PRAI JP 1999-246235 A 19990831 <--
WO 2000-JP5779 W 20000828 <--

AB The films useful for **battery separators** comprise 1-50% polymers formed at least from an unsatd. fused alicyclic compd. by ring-opening polymn. and 1-50% at least one resin ingredient selected from the group consisting of polyolefins having a wt.-av. mol. wt. of 500,000 or lower, thermoplastic elastomers, and graft copolymers. Thus, kneading 20 parts a 20:20:60 mixt. of Norsorex NB (norbornene polymer) powder, a polyethylene having Mw 300,000 and m.p. 132°, and an ultra-high-mol.-wt. polyethylene having Mw 3,000,000 and m.p. 144°, with 80 parts a liq. paraffin at 160° for 6 h, cooling quickly between 2 metal sheets at 0°, pressing the resulting sheet at 115°, biaxially stretching 3.5x3.5 and stripping with heptane gave a microporous film which was crosslinked in air at 86° for 6 h and at 110° for 2 h. The film had thickness 24 μm, porosity 50%, permeability 330 s/100 cm3, piercing strength 560 g/25 μm, SD temp. 129°, heat breakage temp. 221° and surface shrinkage 10%.

IT **9002-88-4**, Polyethylene
(metathesis polymer-polyolefin blends for manuf. of microporous films with good low-**temp**. **shut-down** (SD) property and high-temp. breakage resistance)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-28
ICS H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 39, 52

ST **battery separator** microporous film norbornene ring opening polymer blend; ultra high mol wt polyethylene blend microporous film; **shut down** property
battery separator microporous film; melt down resistance **battery separator** microporous film; thermoplastic elastomer blend microporous film **battery separator**; metathesis polymer blend microporous film **battery separator**

IT Secondary **battery separators**
(metathesis polymer-polyolefin blends for manuf. of microporous films with good low-**temp**. **shut-down**
(SD) property and high-temp. breakage resistance)
IT Polymer blends
Polyolefin rubber
Polyolefins
Thermoplastic rubber
(metathesis polymer-polyolefin blends for manuf. of microporous films with good low-**temp**. **shut-down**
(SD) property and high-temp. breakage resistance)
IT Synthetic rubber, uses
(norbornene, Norsorex NB; metathesis polymer-polyolefin blends for manuf. of microporous films with good low-**temp**. **shut-down** (SD) property and high-temp. breakage resistance)
IT **9002-88-4**, Polyethylene 110807-37-9, Modiper A 1200 (
(metathesis polymer-polyolefin blends for manuf. of microporous films with good low-**temp**. **shut-down**
(SD) property and high-temp. breakage resistance)
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 16 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 133:225590 HCA Full-text
TI Porous polyolefin films suitable for **battery separators** and manufacture of the films
IN Nomi, Shunsuke; Ichikawa, Tomoaki; Yamaguchi, Michiko; Yamamoto, Kazunari; Uetani, Yoshihiro
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2000256499	A	20000919	JP 1999-60434	19990308 <--

PRAI JP 1999-60434 19990308 <--

AB The films comprise ultrahigh-mol.-wt. polyolefins (Mw ≥1 + 106) and other resins having m.p. or softening point lower than the m.p. of the polyolefins, and show **shutdown temp**. ≤135°, porosity ≥40%, and thermal shrinkage ≤30%. The films are manufd. by kneading compns.

contg. the resin above and solvents, forming them into sheets, removing solvents from the sheets, and heat-setting the sheets by impregnating them with poor solvents at a temp. between 15° lower and 5° higher than the m.p. of the polyolefins.

IT **9002-88-4**, Polyethylene
(UHMWPE and LDPE; heat-set polyolefin blend films with high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-28
ICS B29C067-20; H01M002-16; B29K023-00; B29K105-04; C08L023-00; C08L101-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **battery separator** polyolefin blend film porosity; heat set polyolefin film **battery separator**

IT Polyolefin rubber
(TPE 821; heat-set polyolefin blend films with high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

IT Primary **battery separators**
(heat-set polyolefin blend films with high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

IT Polymer blends
(heat-set polyolefin blend films with high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

IT Polyolefins
(ultrahigh-mol.-wt.; heat-set polyolefin blend films with high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

IT **9002-88-4**, Polyethylene
(UHMWPE and LDPE; heat-set polyolefin blend films with high

porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

IT 872-50-4, N-Methylpyrrolidone, uses
(in heat-setting of polyolefin blend films for high porosity and low **shutdown temp.** and thermal shrinkage for **battery separators**)

L51 ANSWER 17 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 133:153195 HCA Full-text
TI Porous films for **battery separators**
IN Ichikawa, Tomoaki; Yamamoto, Kazunari; Nomi, Shunsuke; Uetani, Keisuke; Yamaguchi, Mutsuko
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000219769	A	20000808	JP 1999-22505	19990129

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PRAI JP 1999-22505 19990129 <--

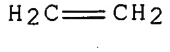
AB The films comprise compns. contg. (a) 50-99% polyolefin compns. contg. ≥1% ultrahigh-mol.-wt. polyolefins with wt.-av. mol. wt. (Mw) ≥1 + 106, (b) 5-15% satd. thermoplastic elastomers with Mw 2 + 104-2 + 105 and comprising 70-90% ethylene blocks, hydrogenated butadiene blocks, and/or hydrogenated isoprene blocks and 10-30% styrene blocks, and (c) 5-35% polyolefin-type thermoplastic elastomers having DSC peak temp. at 80-150° and MFR at 190° and 2.16-kg load ≤10 g/10 min. The films have high strength and porosity and low **shut-down temp.** Thus, 11 parts UHMWPE, 1 part 13:87 styrene-hydrogenated isoprene block elastomer with Mw 2.0 + 104, and 3 parts of an olefinic thermoplastic elastomer (TPE 824) were slurried and dissolved in 85 parts liq. paraffin at 160°, kneaded, formed into a gel sheet while quenching, rolled and biaxially oriented, and soaked in MEK to ext. the paraffin to give films with thickness 16.8 μm, porosity 46.4%, gas permeability 470 s/100 mL, piercing strength 953 g/25 μm, and **shut-down temp.** 133.7°.

IT **9002-88-4**, Polyethylene
(UHMWPE; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM C08J009-28
ICS H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39
ST ultrahigh mol wt polyolefin porous film **battery separator**; UHMWPE porous film **battery separator**; hydrogenated isoprene styrene block rubber thermoplastic UHMWPE; styrene block thermoplastic elastomer polyolefin **battery separator**; olefinic thermoplastic elastomer polyolefin **battery separator**
IT Polyolefin rubber
(TPE 824; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT Isoprene-styrene rubber
(hydrogenated, block; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT Thermoplastic rubber
(styrene block-contg.; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT Secondary **battery separators**
(ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT Polyolefins
(ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT **9002-88-4**, Polyethylene
(UHMWPE; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT 25038-32-8
(isoprene-styrene rubber, hydrogenated, block; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)
IT 105729-79-1D, Isoprene-styrene block copolymer, hydrogenated
(rubber; ultrahigh-mol.-wt. polyolefin-based film **battery separators**)

L51 ANSWER 18 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 133:105971 HCA Full-text
TI Microporous membranes having high strength and low **shutdown temperature**
IN Yamamoto, Kazunari; Uetani, Yoshihiro; Ichikawa, Tomoaki; Nomi, Shunsuke
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000198873	A	20000718	JP 1999-522	19990105

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PRAI JP 1999-522 19990105 <--

AB Title membranes, useful as **separators** for secondary **batteries**, comprise 50-90% polyolefins contg. ≥1% super mol. wt. polyolefins having Mw ≥1 + 106 and 10-50% cryst. thermoplastic polymer having peak temp. measured by DSC 90-150° and melt flow rate at 190° and 2.16 kg wt. by JIS K7210 ≤10. A membrane prepd. from 12 parts super mol. wt. polyethylene with Mw 3 + 106 and 3 parts olefin thermoplastic elastomer (TPE 821) showed void content 60%, piercing strength 580 g/25 μm and **shutdown temp.** 132°.

IT **9002-88-4**, Polyethylene
(super mol. wt.; microporous membranes having high strength and low **shutdown temp.**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-28
ICS C08L023-00; H01M002-16; C08L101-00

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST microporous membrane super mol wt polyolefin; thermoplastic polymer microporous membrane **battery separator**; olefin thermoplastic elastomer microporous membrane
IT Secondary **battery separators**
(microporous membranes having high strength and low **shutdown temp.**)
IT Polymer blends
(microporous membranes having high strength and low **shutdown temp.**)
IT Polyolefins
(rubbers; microporous membranes having high strength and low **shutdown temp.**)
IT Polyolefin rubber
(super mol. wt., TPE 821, TPE 824; microporous membranes having high strength and low **shutdown temp.**)
IT 25101-13-7, Ethylene-methyl methacrylate copolymer
(EMAA; microporous membranes having high strength and low **shutdown temp.**)
IT **9002-88-4**, Polyethylene
(super mol. wt.; microporous membranes having high strength and low **shutdown temp.**)

L51 ANSWER 19 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 132:266202 HCA Full-text
TI Composite membranes comprising laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance
IN Funaoka, Hidehiko; Takeuchi, Hidetoshi; Komiyama, Osamu; Kono, Kimiichi
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2000108249	A	20000418	JP 1998-285794	19981008
			<--	
PRAI JP 1998-285794		19981008	<--	

AB The laminates are prepd. by laminating porous polyolefin membranes contg. ≥1% polyolefins with wt.-av. mol. wt. (Mw) ≥5x105 and having porosity 30-90%, av. pore diam. 0.001-20 μm, and thickness 5-30 μm, with poly(arylene sulfide) fiber nonwoven fabrics with thickness 10-50 μm to give composite membranes exhibiting melt-down temp. (T1) ≥190° and showing >50° difference between T1 and the **shut- down temp.** (T2) of the membranes and exhibiting burning rate ≥10 s/10 cm. Thus, 30 parts of a compn. comprising 100 parts of a blend comprising 5.5 parts polyethylene with Mw 2.5x106 and 24.5 parts HDPE and 0.375 part antioxidant and 70 parts paraffin were kneaded, extruded through a T die at 190°, simultaneously drawn in two directions, and treated with methylene chloride to dissolve paraffin and give a film (A) 25 μm thick and showing av. pore diam. 0.03 μm and porosity 40%. A melt-blown nonwoven fabric of poly(arylene sulfide) fibers was prepd. and pressed together with A film at calender roll temp. 70° to give a laminated composite membrane 51.9 μm thick and showing air permeation rate 711 s/100 mL, T2 135°, T1 200°, and burning rate 25 s/10 cm.

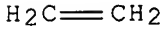
IT **9002-88-4**, Polyethylene
(laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM B32B027-00
ICS B32B005-24; B32B027-12; B32B027-32; H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polyolefin polyarylene sulfide fiber nonwoven laminate membrane permeability; polyethylene polyarylene sulfide fiber nonwoven laminate membrane permeability; **battery separator** polyolefin polyarylene sulfide fiber nonwoven laminate membrane; fire resistance polyolefin polyarylene sulfide fiber nonwoven laminate membrane

IT Polythioarylenes

(fiber, nonwoven; laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

IT Fire-resistant materials
Laminated materials
Nonwoven fabrics
Primary **battery separators**
Secondary **battery separators**
(laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

IT Polyolefins
(laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

IT Polymer blends
(polyethylene-ethylene-1-octene copolymer blends; laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

IT 26221-73-8, Ethylene-1-octene copolymer
(blends with polyethylene; laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

IT **9002-88-4**, Polyethylene
(laminates of ultrahigh-mol.-wt. polyolefin-contg. porous polyolefin membranes with poly(arylene sulfide) nonwoven fabrics for **battery separators** with good permeability and fire resistance)

L51 ANSWER 20 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 132:138610 HCA Full-text
TI Porous film for **battery separator**
IN Higuchi, Hiroyuki; Inoue, Takeshi; Matsushita, Kiichiro; Asano, Takeshi; Shimatani, Shunichi; Nishiyama, Soji
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI JP 2000044722 A 20000215 JP 1998-214014 199807 29 <--

PRAI JP 1998-214014 19980729 <--

AB The invention relates to a porous film, suited for use as a **battery separator**, comprising a porous polymer substrate made of a single layer or a laminated body of polymers selected from ultrahigh mol. wt. polyethylene, high d. polyethylene, polytetrafluoroethylene, etc., and a porous thin layer coated on the substrate using a low m.p. material prepd. by mixt. of a polyolefin wax and higher mol. wt. polyolefins, wherein the low m.p. material covers inside walls of pores as well as the surface of the substrate for realizing the **battery separator** with low **shut-down temp.**

IT **9002-88-4**, Polyethylene
(low d.; porous film for **battery separator**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-40
ICS H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST porous film **battery separator** polyolefin

IT Porous materials
(films; porous film for **battery separator**)

IT Secondary **battery separators**
(porous film for **battery separator**)

IT Fluoropolymers, uses
Laminated plastics, uses
Polyolefins
(porous film for **battery separator**)

IT Films
(porous; porous film for **battery separator**)

IT **9002-88-4**, Polyethylene
(low d.; porous film for **battery separator**)

IT 9002-84-0, Polytetrafluoroethylene 25085-53-4, Isotactic polypropylene
(porous film for **battery separator**)

L51 ANSWER 21 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 131:244400 HCA Full-text
TI Polyethylene microporous films with high mechanical strength and **battery separators** using them
IN Takita, Kotaro; Funaoka, Hidehiko; Kaimai, Norimitsu; Kono, Koichi
PA Tonen Chemical Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 11269289	A	19991005	JP 1998-90685 <--	19980320
JP 3989081	B2	20071010		

PRAI JP 1998-90685 19980320 <--

AB Title films contain (A) 20-98% polyethylene with wt.-av. mol. wt. ≥5 + 105 or its compns. and (B) 2-80% linear ethylene-α-olefin copolymers with m.p. 95-125° prepd. by using single-site catalysts. Thus, a compn. contg. UHMWPE, HDPE, and Affinity HF 1030 (ethylene-octene-1 copolymer) was melt kneaded, rolled, and drawn to give a film showing high tensile strength, low **shut-down temp.**, and rapid **shut -down** effect.

IT **9002-88-4**, Polyethylene
(polyethylene microporous films with high mech. strength for **battery separators**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM C08J009-00
ICS B29C055-02; B29C067-20; C08J009-26; C08L023-06; H01M002-16; C08L023-08; B29K023-00; B29K105-04; B29L007-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35, 52
ST polyethylene microporous film **battery separator**; single site catalyst polyethylene film **battery separator**; mech strength polyethylene film **battery separator**; **shut down** effect polyethylene film **battery separator**; ethylene octene copolymer film **battery separator**
IT Polymerization catalysts
(metallocene; polyethylene microporous films with high mech. strength for **battery separators**)
IT Membranes, nonbiological
(microporous; polyethylene microporous films with high mech. strength for **battery separators**)
IT Plastic films
Secondary **battery separators**
(polyethylene microporous films with high mech. strength for **battery separators**)
IT Polymer blends
(polyethylene microporous films with high mech. strength for **battery separators**)
IT **9002-88-4**, Polyethylene
(polyethylene microporous films with high mech. strength for **battery separators**)
IT 26221-73-8, Ethylene-1-octene copolymer
(single-site catalyst-type; polyethylene microporous films with high mech. strength for **battery separators**)

L51 ANSWER 22 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 131:186015 HCA Full-text
TI Porous polyolefin films and **battery separators** using them
IN Nishiyama, Soji; Matsushita, Kiichiro; Ishisaki, Akira; Wano, Takashi
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11240970	A	19990907	JP 1998-42515	

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PRAI JP 1998-42515 19980224 <--

AB Title films contain polyolefins and low-m.p. noncompatible compds. selected from polymers with viscosity-av. mol. wt. 100-10,000 and C9-22 aliph. compds. and show ion-permeation barrier temp. 105-130° and elec. resistivity (JIS C 2313) ≥20-times as high as that before treatment after heating at 130° for 0.6 s. The films are useful for **separators** of Li secondary **batteries**. Thus, a porous film obtained from isotactic polypropylene and polyethylene wax showed **shut- down** (SD) starting **temp**. 118° and SD elec. resistivity 210 Ω-cm2.

IT **9002-88-4**, Polyethylene
(waxes; porous polyolefin films contg. noncompatible compds. for **battery separators**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-00
ICS C08K005-20; H01M002-16; C08L023-02

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polyolefin porous film **battery separator**; polypropylene porous film lithium **battery separator**; polyethylene polypropylene porous film **battery separator**

IT Fatty acids, uses
(C9-22; porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Fatty acids, uses
(esters, C9-22; porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Amides, uses
(fatty, C9-22; porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Porous materials
(films; porous polyolefin films contg. noncompatible compds. for

battery separators)

IT Plastic films
Secondary **battery separators**
(porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Polyolefins
(porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Polymer blends
(porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT Films
(porous; porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT 25085-53-4, Isotactic polypropylene
(porous polyolefin films contg. noncompatible compds. for **battery separators**)

IT **9002-88-4**, Polyethylene
(waxes; porous polyolefin films contg. noncompatible compds. for **battery separators**)

L51 ANSWER 23 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 130:312978 HCA Full-text
TI Laminated polyolefin porous films with high tensile strength within **shutdown temperature** region useful for **separators** for **batteries** or electrolytic capacitors
IN Kiuchi, Masayuki; Uchimura, Kazutaka
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11123799	A	19990511	JP 1997-292329	19971024 <--
JP 3508510	B2	20040322		
PRAI JP 1997-292329		19971024 <--		

AB The films comprise high-m.p. porous polyolefin films and low-m.p. porous polyolefin films with their m.p. difference ≥20°, which are obtained by stretching to form pores, and have free shrinkage in the machine direction (MD) in the range from the **shutdown temp**. to (the

shutdown temp. + 50°) 5-70%. The low-m.p. porous polyolefin films have thickness 20-80% based on the total thickness of the laminate and modulus ≥104 dyne/cm2 within the **shutdown temp.** range. Thus, Hizex 5202B (polyethylene, m.p. 132°) was sandwiched between F 104 (polypropylene, m.p. 166°) film, stretched, relaxed, and heat-set to give 3-layer porous film showing porosity 45%, tensile strength (ASTM D 822) 15 kg/cm2 in MD and 1.3 kg/cm2 in the transverse direction, and free shrinkage in MD at 160° 52%.

IT **9002-88-4**, Hizex 5202B
(laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

IC ICM B32B027-32
ICS B32B005-18; B32B005-32; H01G009-02; H01M002-16

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52, 76

ST laminated polyolefin porous film **battery separator** ; polypropylene polyethylene laminate film stretch porous; electrolytic capacitor **separator** porous polyolefin laminate

IT Porous materials
(films; laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

IT Electrolytic capacitors
Laminated plastic films
Secondary **battery separators**
(laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

IT Polyolefins
(laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

IT Films
(porous; laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

IT **9002-88-4**, Hizex 5202B 25085-53-4, F 104

(laminated polyolefin porous films for **separators** for **batteries** or electrolytic capacitors)

L51 ANSWER 24 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 129:262849 HCA Full-text
TI Porous films and **battery separators** with improved low-**temperature shut-down** capability therefrom
IN Wano, Takashi; Nishiyama, Souji; Matsushita, Kiichiro
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10237202	A	19980908	JP 1997-42710	19970226 <--

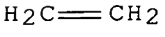
PRAI JP 1997-42710 19970226 <--

AB The title ≥3-layer films, suitable for **separators** of nonaq. electrolytic solns. in **batteries**, consist of at least (a) a middle layer prepd. from mixts. of polyethylene (I; melt index ≤0.35) and polypropylene (II) and (b) layers of II on the outsides of the middle layer and satisfy the relation 2% ≤ I content < 30%. Thus, isotactic II and an 80:20 mixt. of HDPE (MI 0.3) and isotactic II were extruded to give a 3-layer film, which was heat-treated at 135° for 60 h, stretched, and shrunk. The resulting porous film showed I 20%, a peel strength of 100 g/10 mm, and a **shut-down** initiation **temp.** of 126°.

IT **9002-88-4**, Polyethylene
(high-d.; porous multilayer films for **battery separators** from)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM C08J009-00
ICS B32B027-32; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST HDPE polypropylene blend laminate **battery separator**; polyethylene isotactic polypropylene porous film
IT Porous materials
(films; **battery separators** from multilayer polymer)
IT Primary **battery separators**
(from porous multilayer polymer films)
IT Polymer blends
(porous multilayer films for **battery separators** from)
IT Laminated plastics, uses
(porous multilayer films from, for **battery separators**)
IT Films
(porous; **battery separators** from multilayer polymer)
IT **9002-88-4**, Polyethylene
(high-d.; porous multilayer films for **battery separators** from)
IT 25085-53-4, Isotactic polypropylene
(porous multilayer films for **battery separators** from)

L51 ANSWER 25 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 128:116000 HCA Full-text
TI Porous polyethylene films and their manufacture
IN Fujii, Toshio; Nakata, Mamoru; Mochizuki, Tatsuya; Watanabe, Kyoshi; Usami, Yasushi; Nonobe, Taihei
PA Mitsubishi Chemical Industries Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10017702	A	19980120	JP 1996-177997	19960708

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PRAI JP 1996-177997 19960708 <--

AB Title films, useful as **battery separators**, are prepd. from compns. contg. polyethylene having viscosity-av. mol. wt. (Ms) of ≥3 + 105 to <106 and 3-20% aliph. hydrocarbons haing wt.-av. mol. wt. (Mw) of ≤3,000 and softening temp. (Ts) of 90-120°. A compn. of polyethylene with Ms 7 + 105 40, a wax with Mw 670 and Ts 105° 5, and stearyl alc. (I) 55 parts was made into a film, which was soaked in EtOH to remove I and biaxially drawn at 120° to from a film showing pin-penetration strength 450 g/25 μm, gas permeability 500 s/100 cm3, and **shutdown temp**. 131°.

IT **9002-88-4**, Polyethylene
(aliph. hydrocarbon-contg. porous polyethylene films for **battery separators**)

RN 9002-88-4 HCA

CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J011-20
ICS B29D007-01

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 72

ST **battery separator** porous polyethylene film; aliph wax contg porous polyethylene film

IT Secondary **battery separators**
(aliph. hydrocarbon-contg. porous polyethylene films for **battery separators**)

IT Hydrocarbons, uses
(wax; aliph. hydrocarbon-contg. porous polyethylene films for **battery separators**)

IT **9002-88-4**, Polyethylene
(aliph. hydrocarbon-contg. porous polyethylene films for **battery separators**)

L51 ANSWER 26 OF 28 HCA COPYRIGHT 2007 ACS on STN

AN 125:60652 HCA Full-text

TI Porous films for **battery** cell **separators**

IN Nishama, Soji; Higuchi, Hiroyuki; Matsushita, Kiichiro; Yano, Shuji

PA Nitto Denko Corp, Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 08092403	A	19960409	JP 1994-229893	199409 26

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PRAI JP 1994-229893 19940926 <--

AB Title films with Vickers hardness ≥10 and becoming nonporous at 80-140° contain 40-90% polypropylene and 10-60% polyethylene. Thus, 70 parts isotactic polypropylene and 30 parts HDPE were melt kneaded, drawn, heated, and aged to give a test piece showing Vickers hardness 11 and **shut-down temp.** 135°.

IT **9002-88-4**, Polyethylene
(high-d.; polyethylene-polypropylene films for **battery** cell **separators** with good **shut-down** property)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4

$H_2C{=}CH_2$

IC ICM C08J009-00
ICS C08L023-02
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST polyethylene polypropylene **battery** cell **separator**
IT **Batteries**, primary
Batteries, secondary
(polyethylene-polypropylene films for **battery** cell **separators** with good **shut-down** property)
IT Plastics, film
(polyethylene-polypropylene films for **battery** cell

separators with good **shut-down** property)

IT **9002-88-4**, Polyethylene
(high-d.; polyethylene-polypropylene films for **battery** cell **separators** with good **shut-down** property)

IT 25085-53-4, Isotactic polypropylene
(polyethylene-polypropylene films for **battery** cell **separators** with good **shut-down** property)

L51 ANSWER 27 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 118:63281 HCA Full-text
TI **Battery separators** and the **batteries**
IN Nagai, Yozo; Yamamoto, Kazuo; Kawano, Eizo; Yamaguchi, Akio
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 04248253	A	19920903	JP 1991-25285	19910125

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PRAI JP 1991-25285 19910125 <--

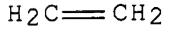
AB The **separators** are composed of porous films having areas of low and hig elec. resistances with the ratio of resistances of the 2 areas = 1.2-5.0. Preferably, the difference of **shut -down temps**. of the 2 areas is ≥5°.

IT **9002-88-4**, Polyethylene
(films, **separators**, with controlled **shut-down temp.**;, for lithium **batteries**)

RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery separator shut down** control; polyethylene **separator** lithium **battery**
IT **Batteries**, primary
Batteries, secondary
(**separators**, porous polyethylene, with controlled **shut-down temp.**)
IT **9002-88-4**, Polyethylene
(films, **separators**, with controlled **shut-down temp.**;, for lithium **batteries**)

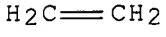
L51 ANSWER 28 OF 28 HCA COPYRIGHT 2007 ACS on STN
AN 115:236306 HCA Full-text
TI Lithium-**battery separators** and lithium **batteries**
IN Kono, Koichi; Takita, Kotaro; Takashima, Tatsuya; Okamoto, Kenkichi
PA Tonen Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 03105851	A	19910502	JP 1989-242854	19890919 <--
JP 2520310	B2	19960731		
PRAI JP 1989-242854		19890919 <--		

AB The **separators** are microporous membranes of polyethylene (PE), contg. >1 wt.% PE having wt.-av. mol. wt. >7 + 10-5 and having wt.-av. mol. wt./no.-av. mol. wt. ratio 10-300; the membranes have thickness 0.1-25 μm, porosity 40-95%, av. penetrating pore diam. 0.001-0.1 μm, and fracture toughness >0.5 kg/10-mm width. The **separators** may be composed of PE having wt.-av. mol. wt. >7 + 10-5. Li **batteries** use these membranes as **separators**. These **batteries** have low **shutdown temp.**
IT **9002-88-4**, Polyethylene
(**separators**, porous, for lithium **batteries**)
RN 9002-88-4 HCA
CN Ethene, homopolymer (CA INDEX NAME)

CM 1

CRN 74-85-1
CMF C2 H4



IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery** polyethylene **separator**
IT **Batteries**, primary
(lithium, porous polyethylene membranes in, for low **shutdown temp.**)
IT **Batteries**, primary
(**separators**, polyethylene, porous, for low **shutdown temp.**)
IT **9002-88-4**, Polyethylene
(**separators**, porous, for lithium **batteries**)

=> D L52 1-9 BIB ABS HITSTR HITIND

L52 ANSWER 1 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 143:62621 HCA Full-text
TI Fuel cell system
IN Taniguchi, Ikuhiro; Suzuki, Keisuke; Iio, Masatoshi; Ito, Yasuyuki; Koike, Yuichi
PA Nissan Motor Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2005158558	A	20050616	JP 2003-396781	200311 27 <--
PRAI JP 2003-396781		20031127 <--		

AB The fuel cell system has a fuel cell contg. a porous **separator** humidifying an anode and/or a cathode; a tank storing water recovered from the **separator**; a temp. detecting means detecting the fuel cell temp.; a water recovering means recovering water from the **separator** to the tank; and a water recovering control means controlling-recovering water inside the **separator** to the tank by the recovering means when the temp. detected by the temp. detecting means is lower than the predetd. **temp**. during the **shutdown** of the system.

IC ICM H01M008-04

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel **cell** system **separator dry** prevention

IT Fuel cells
(structure of fuel cell systems for prevention of **separator** dry-out during **shutdown**)

L52 ANSWER 2 OF 9 HCA COPYRIGHT 2007 ACS on STN

AN 142:180308 HCA Full-text

TI Laminated microporous membrane and preparation method thereof

IN Lee, Sang Yeong; Park, Sun Yong; Song, Heon Sik

PA LG Chem. Ltd., S. Korea

SO Repub. Korean Kongkae Taeho Kongbo, No pp. given
CODEN: KRXXA7

DT Patent

LA Korean

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI KR 2002094819	A	20021218	KR 2001-33274	200106 13

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PRAI KR 2001-33274 20010613 <--

AB A laminated microporous membrane, its prepn. method and a lithium ion secondary **battery** or lithium ion polymer secondary **battery** contg. the membrane as a sepn. membrane are described. The use of the membrane allows a lowering of the **shutdown temp**. and an improvement in the melt integrity without deterioration of the permeability of the membrane. The laminated microporous membrane comprises a polymer supporting layer and a **shutdown** layer prepd. by coating one or both sides of the supporting layer with a polymer having a m.p. lower than that of the polymer of the supporting layer. Preferably the difference of the m.ps. of the two polymers is 40-75°. Preferably the supporting layer has a pore size of 0.001-100 μm and a thickness of 1-50 μm and the **shutdown** layer has a pore size of 0.001-100 μm and a thickness of 0.01-20 μm. The method comprises the steps of making

the supporting layer; coating one or both sides of the supporting layer with a soln. of a polymer having a m.p. lower than that of the polymer of the supporting layer and drying the coated layer, or dipping the coated layer into a solvent and drying it to prep. the **shutdown** layer by phase sepn.

IC ICM H01M002-16
CC 52-1 (Electrochemical, Radiational, and Thermal Energy Technology)
ST laminated microporous membrane prepn lithium secondary **battery**
IT Membranes, nonbiological
(laminated, microporous; **separators** for lithium secondary **batteries**)
IT Secondary **batteries**
(lithium; laminated microporous membranes as **separators** for lithium secondary **batteries**)

L52 ANSWER 3 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 139:233022 HCA Full-text
TI Nonaqeuous electrolyte secondary **battery** with high safety during overcharge
IN Saisho, Keiji; Nakane, Ikuro; Oikawa, Satoshi
PA Sanyo Electric Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2003257485	A	20030912	JP 2002-54804	20020228 <--

PRAI JP 2002-54804 20020228 <--
AB In a Li secondary **battery**, a **separator** is provided with pores through which metallic Li can pass between the electrodes. The **separator** is also provided with a **shutdown** function for preventing the migration of Li ions in case of abnormal temp. increase. The polymer electrolyte in the **battery** comprises a compd. capable of generating radicals enhancing the polymer electrolyte decompn. reaction in the case of **battery** abnormality at the **temp** below the **shutdown temp**. The polymer electrolyte is prevented from inhibiting the **shutdown** function of the **separator**, and the **battery** demonstrates improved safety at the time of overcharge.
IC ICM H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST nonaq electrolyte secondary **battery** safety overcharge **separator** porosity

IT Secondary **batteries**
(lithium; nonaq. electrolyte secondary **battery** with high safety during overcharge)

IT Safety
Secondary **battery separators**
Solid state secondary **batteries**
(nonaq. electrolyte secondary **battery** with high safety during overcharge)

IT Porous materials
(**separators**; nonaq. electrolyte secondary **battery** with high safety during overcharge)

L52 ANSWER 4 OF 9 HCA COPYRIGHT 2007 ACS on STN

AN 135:346796 HCA Full-text

TI Abuse testing of lithium-ion **batteries** characterization of the overcharge reaction of LiCoO2/graphite cells

AU Leising, Randolph A.; Palazzo, Marcus J.; Takeuchi, Esther Sans; Takeuchi, Kenneth J.

CS Wilson Greatbatch Limited, Clarence, NY, 14031, USA

SO Journal of the Electrochemical Society (**2001**), 148(8), A838-A844
CODEN: JESOAN; ISSN: 0013-4651

PB Electrochemical Society

DT Journal

LA English

AB The short-circuit and overcharge behavior of prismatic lithium-ion **batteries** contg. LiCoO2 cathodes and graphite anodes were studied in detail. Internal thermocouples were used to characterize the thermal profiles of the cells under abusive conditions. Differences between the internal and surface temps. of the cells during the safety tests highlighted the importance of the internal measurement for obtaining more meaningful data. Under short-circuit conditions the cells remained hermetically sealed, reached an internal temp. of 132°C (the **shutdown temp** . of the **separator**), and then slowly cooled to ambient temp. However, on extreme overcharge testing different results were obtained depending on the current used to charge the **battery** . At low currents (≤C/5) the cells remained hermetic, but swelled significantly. When higher currents were used, the cells ruptured during overcharge. Exptl. cells were constructed with a systematic variation in cell balance and the point of cell rupture tracked to the amt. of cathode in the cell, independent of the amt. of anode material. The internal dc resistance of the cell was also measured during the overcharge reaction and remained low throughout most of the test, although a large increase was obsd. at the end of the test due to the melting of the **shutdown separator**. The cells overcharged

with high currents all reached high temps. (≥195°C) immediately prior to rupturing, which suggests that the melting of lithium is a key underlying factor leading to the rupture of the cells. To test this proposal, cells were assembled with lithium removed from the LiCoO2 cathode, so that lithium metal would not plate on the anode during the overcharge test. These cells reached a significantly higher temp. (.apprx.280°C) prior to rupture.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium secondary **battery** cobalt lithium oxide graphite

IT Secondary **batteries**
(lithium; abuse testing of lithium-ion **batteries** characterization of the overcharge reaction of LiCoO2/graphite cells)

IT 7782-42-5, Graphite, processes 12190-79-3, Cobalt lithium oxide LiCoO2
(abuse testing of lithium-ion **batteries** characterization of the overcharge reaction of LiCoO2/graphite cells)

RE.CNT 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L52 ANSWER 5 OF 9 HCA COPYRIGHT 2007 ACS on STN

AN 134:150090 HCA Full-text

TI Polyolefin type porous film coated with inorganic thin film and production of the film for **separator** of non-aqueous electrolytic secondary **battery**

IN Igarashi, Satoshi; Tsuboi, Seiji; Omichi, Takahiro

PA Teijin Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001035468	A	20010209	JP 1999-203212	19990716 <--

PRAI JP 1999-203212 19990716 <--

AB This porous film is of a thermo-fusible polyolefin and coated with an inorg. thin film in ≥1 sides: and the inner surfaces of the pores of the film are not coated with the inorg. thin film. The porous film coated with the inorg. thin film is produced by vacuum film formation, e.g. a vacuum evapn., sputtering, or CVD method. The inorg. film may be of an inorg. oxide selected from SiO2, Al2O3, MgO,

CaO, TiO2, ZnO, and Sn oxide. While keeping the intrinsic properties of the porous film as a **separator** of a non-aq. electrolytic secondary **battery**, the porous film is provided with a wide **shut down temp.** range to significantly decrease the risk of heat generation by short circuit.

IC ICM H01M002-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST porous film inorg coating **separator battery**; **shut down temp** coating **separator battery**

IT Sputtering
(film coating formed by; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT Porous materials
(films, polyolefin type; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT Secondary **batteries**
(non-aq. electrolytic; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT Secondary **battery separators**
(polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT Polyesters, uses
Polyolefins
(porous film of; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT Films
(porous, polyolefin type; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT 1305-78-8, Calcium oxide, uses 1309-48-4, Magnesium oxide, uses 1314-13-2, Zinc oxide, uses 1332-29-2, Tin oxide 1344-28-1, Aluminum oxide, uses 7631-86-9, Silicon oxide, uses 13463-67-7, Titanium oxide, uses
(porous film coated with; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

IT 25038-59-9, Poly(ethylene terephthalate), uses
(porous film of; polyolefin type porous film for **separator** of secondary **battery** and film coating method)

L52 ANSWER 6 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 132:336910 HCA Full-text
TI Polymeric **separators** and their manufacture for **batteries**
IN Kami, Kenichiro; Ageshima, Keishi; Amano, Tadayoshi
PA Denso Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2000138048	A	20000516	JP 1998-311193	19981030 <--

PRAI JP 1998-311193 19981030 <--

AB The **separators** comprise thermoplastic cryst. polymers having m.p. ≥150° or thermoplastic noncryst. polymers having glass transition temp. ≥150° and have spongy centers and surfaces having dense pores having smaller pore size than the centers. The **separators** are manufd. by dissolving polymer materials in good solvents for film formation, exposing the films to poor solvents for pptg. the polymers, and then drying to give porous bodies. Thus, Noryl 534 was dissolved in N-methyl-2-pyrrolidone for film formation, and then the film was immersed in iso-Pr alc. and dried to give a **separator**. The **separators** have good ion cond., heat resistance, and **shut-down** performance at high **temp**. and are esp. suitable for secondary Li **batteries**.

IC ICM H01M002-16
ICS B32B005-18; C08J009-28; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **separator** porous polymer film manuf solvent **battery**
IT Polyimides, uses
Polyimides, uses
(polyamide-; porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)
IT Polyimides, uses
Polyimides, uses
Polyketones
Polyketones
Polysulfones, uses
Polysulfones, uses
(polyether-; porous polymer **separators** manufd. by film

formation and solvent treatment for **batteries**)

IT Polyamides, uses
Polyamides, uses
Polyethers, uses
Polyethers, uses
(polyimide-; porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT Polyethers, uses
Polyethers, uses
(polyketone-; porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT Polyethers, uses
Polyethers, uses
(polysulfone-; porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT Secondary **battery separators**
Solvents
(porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT Fluoropolymers, uses
Polybenzimidazoles
Polyimides, uses
Polyoxymethylenes, uses
Polysulfones, uses
Polythiophenylenes
(porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT 67-63-0, Isopropyl alcohol, uses 24937-79-9, Polyvinylidene fluoride 24938-67-8, Noryl 534 24968-12-5, Polybutylene terephthalate 26062-94-2, Polybutylene terephthalate
(porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

IT 872-50-4, N-Methyl-2-pyrrolidone, uses
(porous polymer **separators** manufd. by film formation and solvent treatment for **batteries**)

L52 ANSWER 7 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 131:76147 HCA Full-text
TI Polyethylene **separators** for **batteries** and safe secondary **batteries**
IN Fujii, Toshio; Usami, Yasushi
PA Mitsubishi Chemical Industries Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11185723	A	19990709	JP 1997-349172	19971218 <--
PRAI	JP 1997-349172		19971218 <--		

AB The **battery separators** are sheets contg. 10-80:20-90 wt.% mixts. of linear low-d. polyethylene and fillers, and are prepd. by melt forming and rolling. Secondary **batteries** comprising the **separators** are also claimed,. By adding the fillers, high-**temp. shut down** performance of the linear low-d. polyethylene **separators** is improved due to improved thermal cond.

IC ICM H01M002-16
ICS C08J009-00; C08L023-04; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **battery separator** linear low density polyethylene; safety **battery separator** low density polyethylene; filler **battery separator** low density polyethylene

IT Fillers
Primary **battery separators**
Safety
Secondary **battery separators**
(secondary **battery separators** made of linear low d. polyethylene and fillers)

IT Linear low density polyethylenes
(secondary **battery separators** made of linear low d. polyethylene and fillers)

IT 471-34-1, Calcium carbonate, uses
(filler; secondary **battery separators** made of linear low d. polyethylene and fillers)

IT 74-85-1D, Ethene, polymers with α-olefins, uses
(linear low d. polyethylenes, Linear low d. polyethylenes, linear low d. polyethylenes; secondary **battery separators** made of linear low d. polyethylene and fillers)

L52 ANSWER 8 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 127:223004 HCA Full-text
TI Heat-resistant **separators** suitable for lithium secondary **batteries**
IN Noda, Yukio; Yukita, Yasuo; Fujiwara, Nobuhiro; Sugiyama, Katsuhiko; Nagato, Shinji
PA Sony Corp., Japan; Oji Paper Co., Ltd.

SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 09213296	A	19970815	JP 1996-18904 <--	19960205
JP 3810844	B2	20060816		

PRAI JP 1996-18904 19960205 <--

AB The title sheet **separators** are laminates of heat-nonmeltable microporous layers prepd. from cellulose fibers and pulverized synthetic fiber fibrils of water-holding capacity 210-450% by paper making method, and heat-meltable microporous polyolefin resin layers. The **separators** have excellent **shut down** characteristics (to prevent **temp** . elevation for safety), and prevent short-circuit.

IC ICM H01M002-16
ICS H01M002-16; B32B027-32; D21H013-26
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery separator** fiber fibril;
cellulose fiber **separator** lithium **battery**;
safety lithium **battery separator**
IT Polyamide fibers, uses
(aramid, KY 400S; in heat-resistant **separators** for Li secondary **batteries**)
IT Fibers
(cellulosic; in heat-resistant **separators** for Li secondary **batteries**)
IT Synthetic fibers
(fibril; in heat-resistant **separators** for Li secondary **batteries**)
IT Safety
Secondary **battery separators**
(heat-resistant **separators** for Li secondary **batteries**)
IT Polyolefins
(in heat-resistant **separators** for Li secondary **batteries**)
IT Polyamide fibers, uses
(p-phenylenediamine-terephthalic acid, aramide fibers; in heat-resistant **separators** for Li secondary **batteries**)

IT Polypropene fibers, uses
(pulp, KY 420; in heat-resistant **separators** for Li secondary **batteries**)
IT Fibril
(synthetic fiber; in heat-resistant **separators** for Li secondary **batteries**)
IT 173939-92-9, NBF/H
(polyethylene-polypropylene core-sheath composite fiber; in heat-resistant **separators** for Li secondary **batteries**)

L52 ANSWER 9 OF 9 HCA COPYRIGHT 2007 ACS on STN
AN 121:183488 HCA Full-text
TI Lithium-ion rechargeable **batteries** with LiCoO2 and carbon electrodes: the LiCoO2/C system
AU Ozawa, Kazunori
CS Sony Corporation, Battery Group, 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo, Japan
SO Solid State Ionics (**1994**), 69(3-4), 212-21
CODEN: SSIOD3; ISSN: 0167-2738
DT Journal
LA English
AB Li-ion rechargeable **battery** with LiCoO2 cathode and non-graphitizable C anode has high energy d. By using LiPF6 electrolyte dissolved in propylene carbonate/diethyl carbonate soln., excellent cycle performance was obtained even at a moderately high temp., because (1) LiCoO2 remained stable, and (2) non-graphitizable C exhibited a good cyclability with respect to Li-doping/undoping capability. Although a thin film is formed on the C surface during charge and discharge cycling, the discharge capacity degrdn. is only 10-20% after 500 cycles. Furthermore, even if the cell is overcharged, safety can be attained by (1) providing an anti-overcharging safety device which operates when Li2CO3 in the cathode is decompd. and (2) using a polyolefin **separator** which **shuts down** at a high **temp**. due to overcharge current.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST carbon lithium cobalt oxide **battery** performance; safety carbon lithium cobalt oxide **battery**; lithium hexafluorophosphate electrolyte **battery** performance
IT **Batteries**, secondary
(carbon/cobalt lithium oxide, with lithium fluorophosphate electrolyte, performance of)
IT Safety
(of carbon/cobalt lithium oxide **batteries** during overcharging)
IT Alkenes, uses
(polymers, **separators**, carbon/cobalt lithium oxide

batteries with, for safety during overcharging)

IT 7440-44-0, Carbon, uses
(anodes from lithiated non-graphitizable, cobalt lithium oxide **batteries** with, performance of)

IT 12190-79-3, Cobalt lithium oxide (CoLiO2)
(cathodes, lithium-ion **batteries** with, performance of)

IT 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate
(electrolyte contg. lithium fluorophosphate and, carbon/cobalt lithium oxide **batteries** with, performance of)

IT 21324-40-3, Lithium hexafluorophosphate
(electrolyte, carbon/cobalt lithium oxide **batteries** with, performance of)